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Battelle Technical Review

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EDGAR MARBURG LECTURER

DR. ROBERT C. MCMASTER

Each year, at its annual meeting, the American Society for Testing Materials honors its first secretary through the Marburg Lecture. Edgar Marburg was ASTM's secretary from its founding in 1902 until his death in 1918. He was an outstanding teacher and leader in the field of structural engineering when he accepted the job with the then struggling organization. Over the years, he devoted time and energy to ASTM's development. His leadership built up the Society's reputation for high scientific and technical standards. The Marburg Lecture honors him by presenting leaders in the fields of materials and testing who embody the qualities he valued so highly.

ASTM selected Dr. Robert C. McMaster of Battelle as its Marburg Lecturer for 1952. By its choice, the Society gave special recognition to the new and growing science of nondestructive testing. Bob McMaster has worked in this field since his graduate days. It is almost a religion with him. He sees nondestructive testing as a necessity in these days when materials are being used close to the limits of their strength and products are increasingly intricate. Through such testing, he points out, hidden flaws may be detected without damage from the inspecting process. Much greater safety is the result when life and property depend upon the proper functioning of the product.

Bob has said, "Nondestructive testing is still an art rather than a science." At Battelle he is working with a group that is playing an important part in making a science of the art. As industries seek nondestructive testing methods to apply to their products, new equipment must be devised and new techniques developed.

While he is one of the leaders in nondestructive testing, Bob McMaster has equal interest in other fields. He has done much work on very high voltage, X-ray, X-ray sterilization of micro-organisms, high-pressure arcs, welding, xeroradiography, fatigue in aircraft materials, corrosion fatigue, and other subjects. Bob is a man with ideas. When faced with a problem, he often suggests more approaches than can be used. This same quality has brought him important assignments in the numerous professional societies of which he is a member.

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Voices for Progress

Salesmen are recognized as one of the prime motivating forces of our economy. By their aggressive efforts in distributing the products of industry, they help make practical the mass production of consumer goods. Without the sales executive and his staff, our industrial system would be impossible.

These people also serve another function—one not always too well recognized and appreciated. They are the most avid advocates of product improvement, economy in production, and competition. They not only encourage research and technical improvement, but agitate for and demand it. Nothing is so effective in persuading a board of directors to take positive action on a proposed program of product research as a sales executive's insistence that improvement is necessary to meet competition.

People who sell are more than distributors of goods. They are the eyes and ears of the company. They are the ones who come in direct contact with the distributor or the customer. They know what the customer thinks of the product, what he expects of it, and how it stacks up against that of the competitor. They are usually the first to detect the direction of public demand and the manner in which the competitor is reacting to it. The counsel of the sales executive is highly desirable in planning a research program.

The sales executive and his staff serve still another function in research. They accelerate progress and keep research operating in high gear. Their insistence upon improvements that will lead to more sales keeps funds flowing to the research laboratory. New knowledge, uncovered by the scientist, is put to use—quickly. The research man sees the fruition of his labors in the form of tangible, useful products. The public gains promptly from advances made in technology.

Then there is another function served by sales people, one very important to American enterprise. Sales representatives, like no one else, get into "everybody's" company. They see their own products in use and misuse. They are anxious that their products be correctly applied; that their customers be satisfied and successful. Discreetly, they suggest ways by which the customer can overcome his production difficulties. Frequently, they suggest research. Many an engineer, physicist, and chemist today is working on research that was triggered by the suggestion of a visiting sales representative.

Sales people are creative. They, like research people, deal with ideas. Their contacts with customers often lead to ideas for new products and new industrial operations. They make suggestions which spark technical inquiry.

Just as mass distribution and production owe much to people who sell, so is technical research indebted to them. The sales executive and his staff are voices for progress, as well as distributors of goods.

Clyde Williams

Director, Battelle Memorial Institute

Geophysical Exploration

by Peter Dehlinger

After serving as seismologist and seismic party chief for the Shell Oil Company in California, Wyoming, and Canada, the author received his Ph. D. in geophysics at the California Institute of Technology. He has been at Battelle since 1950, where he has been engaged in research in geophysics and drilling methods.

The unprecedented demand for additional reserves of petroleum and mineral raw materials has steadily increased the need for geophysical exploration. The demand is such that the number of geophysical crews in the field reached an all-time high during 1951[1]. This intensified exploration program has led to the discovery of extensive new oil fields, such as the buried Paleozoic reefs, and has accentuated research toward methods of finding types of deposits which are as yet undiscovered.

Geophysical exploration is the application of physical instruments to detect geological features that are not directly visible. In most instances, these features are overlain by other rocks which mask the subsurface structure. For the detection of these features the instruments are usually located on the surface. In off-shore exploration the instruments are used on or below the surface of the sea; in certain surveys they are used above ground, as in a plane or a helicopter; and in others they are used below the surface, as in mines or boreholes. Some geophysical instruments can detect the presence of mineral deposits directly, e. g., the magnetometer measures the magnetic susceptibility of ores and the Geiger-Mueller counter their radioactive disintegration. Usually, however, geophysical measurements are indirect. The seismograph resolves attitudes of subsurface formations, but does not indicate the presence of oil or specific ores, and the gravity meter responds only to excesses or deficiencies of mass.

A striking similarity in the methods, objectives, and to some extent, techniques, exists between the fields of geophysical exploration and nondestructive testing. In both, anomalies not directly visible are detected with instruments which utilize or measure one of numerous physical properties. The principal difference between the fields concerns the size of the bodies investigated. Because of the similarity between these two fields, one may expect future developments in either to affect the other.

Geophysical Exploration Techniques

Any physical properties of rocks which can be detected instrumentally may be utilized in geophysical exploration[2]. Among these are elasticity, density, magnetic susceptibility, quality of fluorescence, natural radioactivity, resistivity or conductivity, the natural potential of a rock type, the temperature of a structure, the behavior of rocks in an electromagnetic field, and the response of rocks to induced radioactivity. Utilization of one or more of these properties has certainly been significant in the location of oil[3], sulfur, and water. Except in the case of magnetic and radioactive minerals, these properties have been utilized less successfully in the location of ores.

The principal fields of geophysical exploration, which have found wide-spread application since the 1920's, include seismic, magnetic, gravitational, and electrical methods. Various types of instruments and techniques of application have been developed in each of these fields during the last 20 years. Although these developments are valuable and extensive, few of them during this period have been of a fundamental nature. The limiting factor in extending these techniques has been either the inherent resolving power of the properties measured or the difficulty in interpreting the data. Sensitivities of instruments, on the other hand, have been developed to such a high degree that in most cases further instrument refinement is of secondary value. Further developments in these four fields necessitate fundamental research. More recent methods of exploration, some of which are already important, include measurement of natural and induced radioactivity, fluorescence in ultraviolet light, geothermal variations with depth, and a variety of geochemical techniques. Considerable emphasis has been placed on borehole measurements with various types of geophysical instruments.

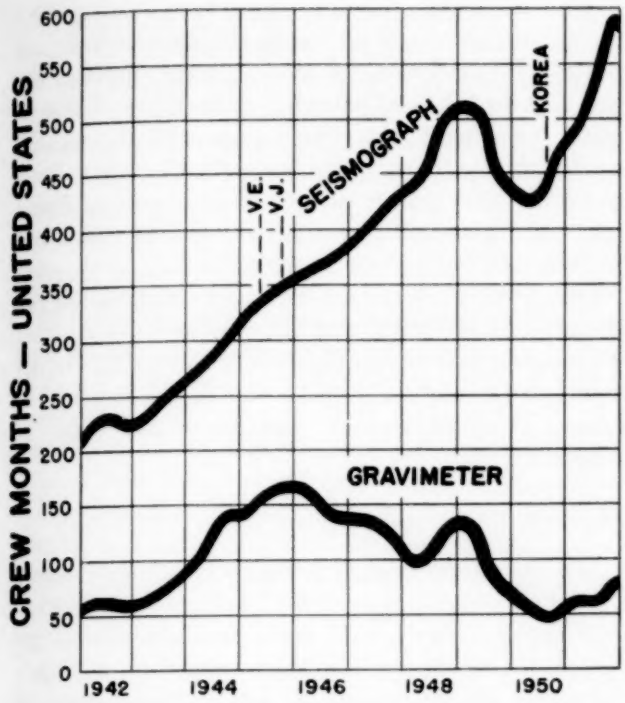

Figure 1. ***Variations in the number of crew-months worked by parties in the United States from 1942 through 1951. After Eckhardt in World Oil.***

Seismic Methods

The seismograph, when applied in sedimentary areas of relatively simple geology, has a higher resolving power in determining depth and shape of subsurface structures than any of the other geophysical tools. Seismic exploration is based essentially on time measurements of reflected and refracted waves transmitted through the ground. From these time measurements and the known locations of receivers, ray paths and the velocities of waves can be calculated. Depths to a number of reflecting horizons are then computed, and from numerous seismic "shots" structural contour maps are constructed. Subsurface geologic features are interpreted from these maps and from vertical cross sections of plotted reflection or refraction data.

Seismic surveys are usually made with equipment mounted on trucks or boats. Exploration in arctic areas has been made with sled-mounted equipment. In recent years, portable equipment flown in by plane and then transported by foot has been used in inaccessible areas. Arctic floating ice thickness measurements have also been attempted recently in which seismometers with attached radio transmitting sets are dropped on the ice from a plane. A charge of dynamite is then dropped and the energy received at the seismometers is telemetered back to the plane. Ice thickness can be calculated from observed frequencies of air-ice coupled surface waves[4].

Magnetic Methods

Magnetic prospecting was first applied with a compass in the 17th Century for the location of ores in Sweden. Since then extensive surveys have been made to detect variations in the earth's magnetic field. Some of the observed magnetic anomalies produce fields larger than the earth's normal field, the largest of which, near Kursk, Russia, has a field strength more than three times that of the earth. These anomalies, whose field strength varies as the inverse square of the distance from the source, are produced by ferromagnetic materials such as magnetite, ilmenite, pyrrhotite, and franklinite. Prospecting for nonmagnetic ores, such as gold, is sometimes done with a magnetometer when the nonmagnetic minerals are detected indirectly by their association with the magnetic minerals, as in placer deposits. Usually magnetic techniques are employed to locate iron ores or to determine configurations of "basement" rocks, and anomalies associated with iron deposits or "basement highs" are nearly always positive. However, it has been recently observed that certain types of iron deposits containing hematite in conjunction with a titaniferrous ore may produce negative anomalies[5].

Much of the present magnetic exploration utilizes the flying magnetometer, in which continuous measurements of the earth's total field are obtained. A variety of magnetometers have also been used on the ground. Magnetic methods provide a direct means of

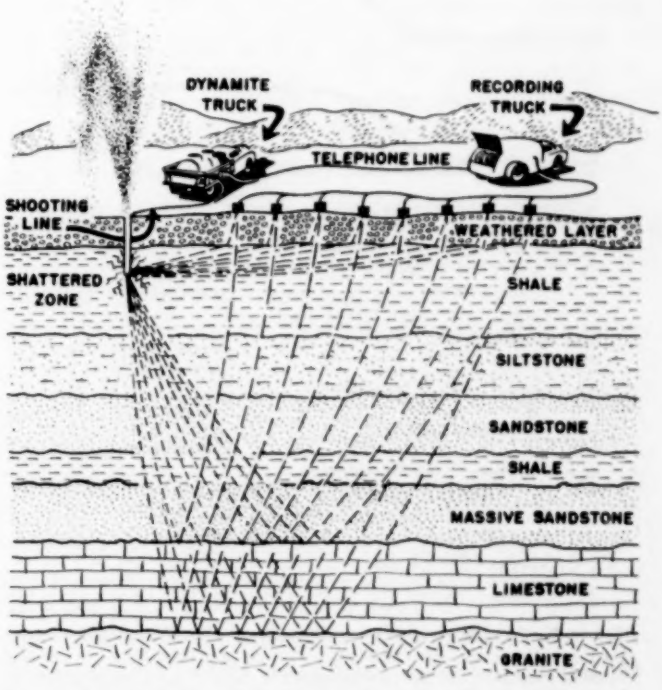

Figure 2. ***Method of seismic shooting in the field. Both refracted and reflected paths of the seismic waves are shown from the shot point to the different geophones.***

detecting magnetic ores and are a relatively cheap and rapid reconnaisance exploration tool, but a definite and inherent limitation of the methods is that structures cannot be defined exactly from the data.

Gravity Methods

In gravity exploration, variations in the earth's gravitational field are measured. These variations are produced by anomalous masses in the upper crust and are indicative of density variations in rocks. Mathematically, gravitational attraction is treated in the same way as magnetic attraction: fields of force in both follow the inverse square law. Gravity measurements are commonly made with any of a variety of gravity meters, which measure differences in gravity, because these meters provide high accuracy and rapid operation. The torsion balance, used before the gravity meter was developed, although not now in common use, measures gravity gradients. Pendulum measurements provide absolute values of gravity but are usually confined to government surveys for regional gravity pictures. Since gravitational anomalies reflect changes in mass, gravity surveys are most reliable for locating bodies of strong density contrast, such as buried salt domes, and buried ridges of igneous rock. In oil prospecting, gravity surveys usually attempt to locate buried anticlinal structures in either sedimentary or "basement" rocks. However, correlations of gravity maxima with such structural highs as anticlines are subject to question. In practice, gravity maxima are thus usually followed up with other types of instruments, principally the seismograph. Until recently, gravity surveys have been confined primarily to land operation. Now gravity meters are also used in diving bells for exploration under the sea and in mines and boreholes for subsurface exploration.

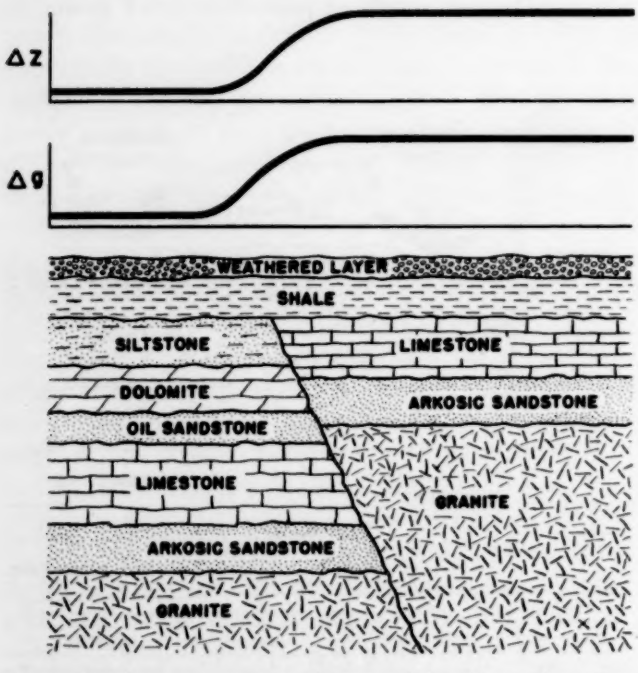

Figure 3. ***The two curves at the top of the illustration show the variations in the vertical force of gravity (Δg) and the vertical component of the magnetic field (ΔZ) over a hypothetical faulted section. Because of the shallower depth of the granite, the right side of the section has a relatively higher density, thus a larger value of Δg, and a higher magnetic susceptibility, thus a larger ΔZ.***

The primary advantage of gravity exploration lies in the relatively quick and cheap reconnaissance that it provides. Like magnetic data, gravity data do not have unique solutions so that such measurements can suggest only qualitatively the shape and depth of anomalous masses.

Electrical Methods

Various phenomena of the natural or induced electrical fields of the ground are measured in electrical prospecting. These phenomena include natural potential, i.e., fields resulting from natural currents produced by electrochemical action in the current, resistivity, conductivity, or distribution of potential in the ground, electromagnetic fields in the ground, and recently, telluric or natural earth currents[6]. The resistivity and self-potential methods, the most important of the electrical prospecting techniques, find their widest application in borehole analyses where they are used to determine porosity and water content of formations as well as to correlate sedimentary beds between adjacent boreholes. On the surface of the ground the resistivity and potential distribution methods are used to locate variations in conductivity of rocks and the self-potential method to identify oxidizing bodies such as sulfide ores located near the water table. Application of the electromagnetic methods have generally been restricted by their limited vertical penetration of the ground and the difficulty in interpreting such data. Electrical and electromagnetic methods are usually applied on the surface of the ground or in mines and boreholes. A method for airborne electromagnetic prospecting has been advanced recently, and is used in detecting shallow sulfide deposits[7].

Advantages in electrical methods lie not only in their relatively rapid and cheap application, but in the direct measurements afforded. For example, with the exception of induced radioactive logging, electrical methods are the only geophysical techniques currently used that can respond directly to the presence of oil. To date, however, it has been possible to exploit this property only in borehole analyses.

Although the resistivity method is capable of penetrating the ground to great depths, its usefulness, as

well as that of the other electrical methods, has been limited to defining shallow structures. Interpretations of electrical data from structures at greater depths have been highly unsatisfactory in spite of extensively developed electrical theory. Further extensions of electrical methods will largely depend upon improvements in interpretation.

Other Methods

Of the other geophysical exploration methods, perhaps radioactive techniques are used most widely. Gamma-ray surveys for the location of near surface radioactive materials with both Geiger-Mueller and scintillation counters have recently found wide application. These surveys have been made on the surface of the ground, at low elevations in airplanes and helicopters, and in mines and boreholes. Induced-radioactive methods, in which a formation is bombarded with neutrons to detect its hydrogen ion content and thus its water or hydrocarbon content, have been applied extensively in borehole analyses, particularly in correlating formations between adjacent wells.

Surveys have been made with ultraviolet light to detect the presence of fluorescent minerals, such as fluorspar, scheelite, and willemite. In an Idaho mine, where stibnite was the principal ore mineral, for example, a fluorescent examination of the ore showed the existence of tungsten; this mine became a major domestic source of tungsten during the last war. Fluorescent techniques have also been used to a small degree on soils and cuttings from boreholes to detect the presence of crude oils. In geothermal exploration, anomalous thermal gradients are detected in the upper parts of the earth's crust, as in boreholes or mines. Where these anomalies are local, they may be indicative of such structural features as faults and folds, depths to "basement" rocks, and salt domes, or they may be caused by chemical reactions, as in the oxidation of ores.

Although geochemical methods[8] of exploration are not strictly geophysical in nature, they are included here since they concern prospecting. Geochemical exploration is still in its infancy. It has not been applied with much success to date in finding new deposits, although chemical methods are becoming increasingly important as an exploration tool. More precise chemical analyses are now available than was the case even 8 or 10 years ago. Isotope studies in particular have made tremendous strides in the last few years. They may have significant bearing on future explorations, especially in obtaining a better understanding of the origin of various ores and minerals. Isotopic analyses would be useful in guiding further prospecting programs. For example, the isotopic sulfur content from

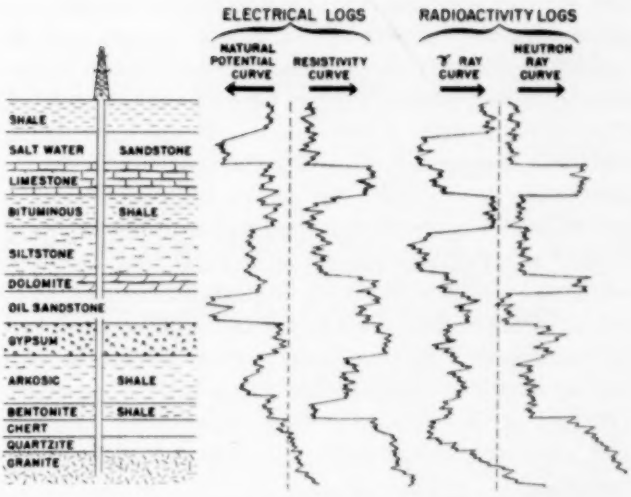

Figure 4. ***Hypothetical electrical and radioactivity well-logging curves for different types of rocks. The direction of increase in each curve is indicated by the arrows. Increasing self-potential indicates greater porosity; increasing resistivity, a decrease in the electrical conductivity of the rock; increasing gamma ray, an increase in the natural radioactive content of the rock; and increasing neutron ray, an increase in the denseness of the rock or a decrease in its fluid content.***

several regions has been studied by Thode, MacNamara, and Collins[9], who found that the pyrite in Franklin, New Jersey, may at one time have been in a sulfate form. This throws some light on whether the pyrite is of primary or secondary origin. Spectrographic methods have also been used for tracing unsuspected elements in ores from mines which are exploited for other minerals. The significance of testing for trace elements is illustrated by the discovery and eventual recovery of minute amounts of rhenium from molybdenum concentrates. Another geochemical technique attempts to trace elements in surface and subsurface waters which can eventually be followed back to their source. Chemical analyses of trace elements in plants have been used to disclose local mineralization.[10] In the San Manuel Copper District of Arizona, for example, the copper and zinc content of plants was found to be significantly higher than those of similar plants in other areas.

Applications of Geophysical Methods

In oil exploration the principal geophysical tool for both reconnaisance and detailed exploration is the seismograph, because of its superior depth control. Useful as the seismograph has been, however, the need for increasing its resolving power is apparent throughout the industry. To locate stratigraphic oil traps with the seismograph requires significant refinements in technique. Through research, a number of oil companies have been attempting to refine the seismograph, but fundamental research rather than refinement is needed.

The flying magnetometer is used in the oil industry for reconnaissance surveys of "basement" rocks, and its widest application is in relatively unexplored areas. Gravity meter surveys on land, which were in considerable demand only a few years ago, are now being used less frequently[1]. Some off-shore gravity data are now being sought with the use of a diving bell. The gravity meter is also being used in boreholes to afford a more accurate determination of local rock densities which are useful in studying stratigraphy as well as to aid in determining seismic velocities. Electrical and radioactive well surveys have become important, and further developments in these fields can be expected. Logging with seismic, thermal, fluorescent, gravity, and chemical means will also become increasingly important.

In the mining industry geophysical methods of exploration have found relatively little application, and there is need for significant advancement before geophysics is widely applied in this field. The flying magnetometer has been useful in locating new deposits of iron and titanium, some of which may be deeply buried in inaccessible as well as in accessible areas. Magnetic prospecting on the surface has also been done for many years with various types of magnetometers, dip needles, and dial compasses. Electrical methods have been used in locating shallow ore deposits. Radioactive techniques in particular, but also thermal, fluorescent, and chemical methods, are being used more and more frequently in mining exploration. The gravity meter has been used underground in mines for local exploration of ores. Neither the gravity nor the seismic methods, as applied on the surface of the ground, have found wide application in mining because the resolving powers of these techniques are generally too low in the light of the complex geology and rough terrain usually encountered. Development of higher resolving-power seismic techniques would be of considerable interest in mining as well as oil exploration.

In engineering geology, investigations of water supplies and the exploration of dam sites and road beds are usually made with refraction seismic and electrical resistivity techniques. The refraction techniques have been used most successfully in the location of large dam sites, whereas the resistivity techniques are applied more in highway and levee construction[11]. Both methods are used in locating water tables and in subsurface water studies.

Future Developments

Hope for new geophysical exploration techniques from World War II developments, for example radar or ultrasonics, have been expressed but not realized. Most geophysicists have found that the frequencies used in these methods are too high for transmission through the ground, although Barrett[12] claims to have found that the ground is relatively transparent to high-frequency electromagnetic waves of specific frequencies.

From all appearances, the present large-scale exploration program for natural resources will continue for at least the immediate years ahead, with major emphasis on the seismograph, radioactivity, and very likely, chemical techniques. Borehole analyses will also be used widely. Research and development toward new methods of exploration as well as toward optimum refinements of present techniques should undoubtedly continue, with the hope of locating deposits not yet detectable. Prospecting of the future will also be concerned with finding lower grade deposits, reducing costs of exploration, and searching for deposits in the still relatively unsurveyed regions of the world, such as the continental shelves and ocean floors.

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Light Metals Face a Busy Future

by CHARLES M. CRAIGHEAD

The author is a specialist in research on nonferrous metals, particularly aluminum, magnesium, titanium, and molybdenum. He has first hand knowledge of the problems not only in the United States but in Latin America and in Europe. Before joining the Battelle staff in 1941, he had served as research metallurgist with the Aluminum Company of America and with the Reynolds Metals Company.

ALREADY important because of their wide use in defense industries, the light metals face a bright future as manufacturers of civilian goods increasingly employ aluminum and magnesium in the fabrication of more products. The growing need for lightweight, high-strength metals presents a challenge to the technologists and industries concerned with their development.

The supply of aluminum, the metal that had so much to do with aviation progress, is gradually catching up with the defense-induced demand. Moreover, prospects for greatly expanded production hold a promise of supplies of the metal adequate for civilian needs. Expansion plans of the three principal producers of primary aluminum, Alcoa, Reynolds, and Kaiser, plus the planned output of the new entrant in this field, Anaconda, will virtually double United States capacity —from 715,000 tons in 1950 to about 1,500,000 tons in 1953.

This seems a large order, but the record of the aluminum industry and its technology in World War II indicate that the job can be done. Technical progress during the war years featured the development of higher strength alloys and improved methods of rolling, extruding, and fabrication. The cladding of strong aluminum alloy surfaces with pure aluminum for greater corrosion resistance made rapid progress.

Ore and Power for Aluminum

Supplies of bauxite ores, from which aluminum is obtained, are ample to support immediate expansion unless a submarine menace should cut off the Guianas and other Caribbean sources. The discovery of workable ore deposits in Jamaica and Haiti has augmented total Western Hemisphere reserves. In addition, as a result of developmental work during World War II, it is now possible to use large quantities of lower grade domestic bauxites.

Believed by some to be a potential bottleneck to expansion plans is the shortage of low-cost power in the United States. Two avenues exist for overcoming this obstacle. One is the wider use of natural-gas-generated power which can be developed more cheaply than coal-generated steam power. New plants being set up by Alcoa and Reynolds in Texas, and by Kaiser in Louisiana, will use this type of power. In spite of the trend, however, highly efficient coal-generated steam power plants are still in the picture, as typified by Alcoa's new plant at Rockdale, Texas, that will utilize lignite as its source of power.

The other avenue is to use the extensive low-cost hydroelectric power resources of Canada and Alaska. The Aluminum Company of Canada has started construction on the first unit of a $50 million project in British Columbia that is planned to produce ultimately around 500,000 tons of metal annually. Alcoa has also been considering the establishment of a 400,000-ton plant in Alaska. These longer term projects, if realized, could supplement continental United States capacity considerably beyond its own immediate expansion goals.

It may be questioned whether the domestic and world economy will be able to absorb expanded aluminum production when normal peacetime conditions return. But the postwar spurt in popularity of the metal for building materials, ships, trucks and trailers, railroad tank cars, irrigation pipe, household appliances, and scores of other applications should allay such doubts. Its versatility is pushing aluminum ahead rapidly in competition with many well-established metals. More and more of the metal is being used instead of copper in the electrical industry.

This favorable picture is further reinforced by another factor. The present expansion of the forging and extrusion capacity of light metal plants, designed primarily for the long-range aircraft program, will make the light metals available for peacetime use in forms previously unavailable.

Expansion of Magnesium Industry

Though not yet as extensively used as aluminum on a volume basis, magnesium is following a similar successful pattern of development. Ample supplies of raw materials, constant improvement in production and fabrication techniques, and a continually widening variety of industrial and military applications have worked together to assure magnesium an increasingly important position in the light metals group. As a result of these factors, the price of the metal has shown a steady downward trend from a high of $5 per pound in World War I to the current 24½ cents.

Production of primary magnesium, estimated at 16,000 tons in 1950, was pushed up to an annual rate of 24,000 tons during the latter part of that year. All of this production had been from Dow's Freeport (Texas) electrolytic plant which gets its magnesium from sea water. With the reopening of six government plants and capacity output at Dow's Freeport operation, production is now up to a rate of around 125,000 tons annually. This is almost eight times the output of 1950, but still far short of the record 184,000 tons attained in 1943 from plants having a rated capacity of 293,000 tons. Among leading fabricators of present output are Wyman-Gordon (forgings), Howard (foundry products), and Brooks and Perkins (wrought products).

Shortage of low-cost power also stands as a potential bottleneck to expansion plans for the magnesium industry. As a result, more attention is being focused on production by the so-called ferrosilicon furnace process, originally employed during World War II to reduce the need for critical direct-current conversion equipment. This process has not been as economical as the conventional electrolytic method. It has the great advantage, however, of needing only about half as much electricity, most of which is consumed in making the ferrosilicon used in the process. At the war's end, the operating costs (not including amortization) of plants using the Pidgeon version of this process had been reduced to a point below the selling price of magnesium. Three of the six government plants which are being reopened use the Pidgeon process, and further reduction in operating costs is anticipated, particularly if the process can be made continuous.

Future of Magnesium

Of great significance to the future of the industry is the plan announced by Dow in 1950 to construct a continuous rolling mill for magnesium at Madison, Illinois. It is designed to increase present capacity from 200 tons of sheet monthly to about 1,500 tons. Through narrowing the spread between the low price of sheet magnesium, this facility should boost the growth rate of the industry.

Major use today for magnesium is for aircraft and other forms of transportation where advantage is taken of its high strength-weight ratio to convert dead load into payload. Recently, plans have advanced to construct a wing for the F-80 airplane made entirely of magnesium alloys. Such a design is expected to leave space for larger fuel tanks, thereby providing a 30 per cent increase in range. Like aluminum, magnesium's lightness has also made it a useful material for many household appliances.

Recent developments in high-strength magnesium alloys, such as ZK 60; the low-density high-strength magnesium-lithium alloys; and the magnesium-cerium alloys, for elevated-temperature service, will continue to expand the fields of application for magnesium.

6

Scientists daily create for their own, words and symbols peculiar to themselves and their particular field of inquiry. This "slang", as Sir Henry Dale called it when he was President of the Royal Society, has now become so stylized and specialized that workers in one branch of science find it difficult to understand the language of another, even kindred, branch. Those scientists who complain that the layman is interested only in the "mysteries" and "magic" of science are usually those who do not really appreciate that their "working language" is to others as the cabala and confuse lack of knowledge with lack of intelligence. One cannot be intelligent about things of which one is ignorant. If scientists, as they profess, want people to understand the facts of science, they must be prepared to find the common idiom.

—RITCHIE CALDER, *Profile of Science*

Notes From Battelle

BITUMINOUS STOKER COALS

The development of a standard procedure for evaluating residential stoker coals has just been announced by the Stoker Manufacturers Association and Bituminous Coal Research, Inc. Four laboratories took part in the research leading to the standardization of the tests. In addition to Battelle, The Illinois Geological Survey, Eastern Gas and Fuel Associates, and The Department of Mines and Technical Surveys of Canada participated.

Each of the laboratories has the same type of equipment. Their procedure has been to exchange samples of coals and then compare the findings from their tests. Through cooperative study, the laboratories have eliminated some of the test features originally used, but which were too difficult to carry out after consideration of the value of the data they provided. Dropping these features has greatly simplified the tests. At the same time, the laboratories have found that the results of the tests are satisfactorily reproducible.

The test program is to be broadened by the inclusion of borderline coals and even those known to be undesirable for use in stokers. By subjecting this wide variety of coals to tests, the broadest possible basis for interpreting results can be developed.

LEAD-SILVER BABBITT FOR BEARINGS

During World War II, there arose the problem of finding a substitute for the highly important 85 per cent tin-babbitt bearing used on railroads, diesel engines, and in other industries. After a brief study of the problem, Battelle engineers developed a lead-base babbitt containing silver. It has physical characteristics comparable to, and may be used in place of, tin-base babbitts.

The manufacture of the lead-silver-babbitt began in 1943. Since then, hundreds of tons of the alloy have been produced. The new babbitt found its way into many fields, and today it is accepted as a standard item by leading manufacturers of electric and diesel electric locomotives.

Users of the lead-silver babbitt have found that its cost is less than that of the tin-base babbitt that it was designed to replace. This economy, plus the fact that the supply of lead-silver babbitt is not affected by defense induced shortages, makes it a material of continuing importance.

COATING BY VAPOR DECOMPOSITION

Greater use of high-temperature processes in industry has stimulated research in refractory metals (such as tungsten, molybdenum, chromium, titanium, etc.), their alloys, and their fabrication. Manufacturing difficulties and high cost often make the fabrication of products from such metals mechanically impossible or economically impractical. Yet the nature of a product may call for the heat- or chemical-resistant qualities that a particular refractory metal possesses. In many cases, the deposition of a coating of the metal is sufficient to supply the needed qualities.

The use of vapor-phase techniques of depositing coatings of refractory metals has been found particularly effective. I. E. Campbell and C. F. Powell, of Battelle, who have been working on this problem, point out that research has just begun to develop some of the many possible applications of the process. Vapor coating has been used experimentally in coating wire, rod, die blocks, crucibles, nozzles, and exhaust-chamber linings. Commercial applications of the process are increasing. However, many application of the process await further research and development.

WELDING OF MOLYBDENUM

Research on the causes of brittleness in molybdenum welds and methods of eliminating the causes has been under way at Battelle since 1949. While the investigation has not been concluded, some discoveries have been made. It was found that ductile resistance-upset welds can be made in high-purity molybdenum if contamination of the welds is prevented. Thorough cleaning of the faying surfaces before welding, and shielding the welds from the air during welding are necessary. Resistance-upset welds with some ductility can be made in commercial arc-cast molybdenum that is deoxidized with carbon. It has also been found that heat treatment will produce some ductility in resistance-upset welds in commercial-swaged powder-metallurgy molybdenum, but porosity is a serious problem.

A pamphlet, *Welding of Molybdenum,* presents an extended report on this research. It was prepared by W. H. Kearns, H. B. Goodwin, D. C. Martin, and C. B. Voldrich, all of Battelle. The pamphlet may be obtained from the Office of Technical Services, Department of Commerce, Washington 25, D. C. The cost is 15 cents.

MEASURING PERMEABILITY OF RUBBER

Since World War II, when the storage of fuels and other liquids in rubber containers was first widely practiced, the permeability of rubber has become an important problem. For economic reasons, the permeability rate of liquids through rubber and rubber fabrics is worthy of study. Even a small amount of permeation can be costly if expensive liquids are stored for a long period of time.

A study made by William J. Mueller at Battelle has shown that with all rubber-liquid combinations, permeability increased logarithmically with temperature. There was also some indication of relationship between increase in vapor pressure and permeability resulting from increasing temperature. Of the liquids tested (diisobutylene, SR-6, methyl alcohol, methyl ethyl ketone, carbon tetrachloride, ethyl acetate, and benzene), benzene had greatest permeability through four of the five types of rubber tested. Diisobutylene and methyl alcohol had the lowest permeability. Of the rubbers tested, Thiokol, a polysulfide rubber, had lowest permeability for every liquid.

Because of the great variety of liquids that may be stored and the many types of rubber and fabrics available for containers, much research still needs to be done in this field.

RESEARCH TO CONSERVE NICKEL

The acute shortage of nickel and chromium has led to research in the development of heat-resistant alloys for castings which require smaller amounts of the strategic metals. Important research in this field is sponsored by the Alloy Casting Institute at Battelle.

The ACI research is being concentrated on the development of cast alloys for use in the intermediate temperature zone, the 900-1400°F. service. The particular composition has been given the HF designation. From their knowledge of the iron-chromium-nickel alloy system, metallurgists selected the HF alloy containing from 18 to 23 per cent chromium and 8 to 12 per cent nickel as the type most likely to have the needed strength and corrosion resistance.

The research team is investigating a series of 14 compositions within the HF alloy range to determine which will offer the best mechanical properties at elevated temperatures. If present research continues favorable, it is hoped that this grade may be substituted in many cases for materials containing appreciably more nickel. This would free supplies of nickel for higher temperature applications.

The HF grade probably could have been investigated for this use a long time ago, except for the mistaken assumption that its properties in the 900-1400°F. range are markedly inferior to the higher alloy materials now used. This incorrect idea doubtless arose from the fact that the wrought stainless steels containing about 18 per cent chromium and 8 per cent nickel have considerably less high-temperature strength than the cast alloys of the 25 per cent chromium—12 per cent nickel, and 35 per cent nickel—15 per cent chromium types. However, this is not true in cast alloys, because the latitude of composition possible in cast alloys allows the use of chemical ranges unsuited to wrought alloy production. Tests now being made indicate that the cast HF materials have strength properties comparable to those of higher alloyed cast grades at these intermediate temperatures.

THE PROBLEM OF TRACE ELEMENTS

A deficiency of trace minerals in soils cannot always be corrected by adding the needed minor elements. According to Dr. Frank A. Gilbert, of Battelle, such minerals may be made unavailable to plants because of microbiological action, an upset of the mineral balance, and for other reasons.

At present, the analysis of soils to determine what trace elements are needed is excessively expensive. Skilled personnel and costly equipment are needed to arrive at accurate determinations of the small amounts of the minor elements in soils. In this situation, the farmer must be satisfied with less accurate methods.

Dr. Gilbert suggests that the best practical method of checking soils for their trace-elements needs is to make tests on small plots. If the grower obtains a small supply of the minor soil elements, and experiments, he can soon tell from the results of his tests if his soil is deficient. Experiments at Battelle have shown that, except with boron, there seems to be little danger of bringing about conditions toxic to plants.

RECENT PAPERS BY THE RESEARCH STAFF*

Manganese for the Steel Industry. F. W. Boulger and R. C. Buehl. *Journal of Metals*, May, 1952.

Vapor Deposition May Solve Today's Coating Problem. I. E. Campbell and C. F. Powell. *Iron Age*, April 10, 1952.

Success of Ceramic-Lined Rocket Motors. W. H. Duckworth and H. Z. Schofield. *Columbus Technical Council News*, May, 1952.

Minor Elements. F. A. Gilbert. *Farm Chemicals*, May, 1952.

The Uranium-Carbon System. M. W. Mallett, A. F. Gerds, and H. R. Nelson. *Journal of the Electrochemical Society*, May, 1952.

The Formation of Metallic Coatings by Vapor-Phase Techniques. C. F. Powell and I. E. Campbell. *Metal Finishing*, April, 1952.

Bituminous Coal Research. A. C. Richardson, H. W. Nelson, and R. B. Engdahl. *Mining Congress Journal*, February, 1952.

Report on the Elevated-Temperature Properties of Stainless Steels. Ward F. Simmons and Howard Cross. *Special Technical Publication*, No. 124, American Society for Testing Materials.

Metals and Minerals in the Free World. J. D. Sullivan. *The Mining and Contracting Review*, April, 1952.

***In most cases reprints will be available upon request to the Editor of the* BATTELLE TECHNICAL REVIEW**

A Word About Battelle Technical Review Abstracts

The abstracts that appear in the following pages are prepared from approximately 900 American and foreign technical journals, as well as from books and other literature received in the Battelle Library. Prepared by a professional staff trained in various technological fields, the abstracts are selected for their usefulness to the Battelle research staff. They are now being made available to technologists and scientists in industry and research in all parts of the world, through the pages of the *Battelle Technical Review*.

BATTELLE TECHNICAL REVIEW ABSTRACTS

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AGRICULTURAL RESEARCH 439a
Plant and animal nutrition; insecticides; fungicides; fertilizers; weed control; soils; etc.

ANALYSIS—CHEMICAL AND PHYSICAL 400a
Methods and apparatus for qualitative and quantitative determination of the composition of matter.

APPARATUS, METHODS, AND STANDARDS 404a
Industrial measurement, inspection, and control; laboratory equipment and procedures (except when auxiliary to other subjects); standards and specifications.

CERAMICS 416a
Abrasives; inorganic cements; glasses; ceramic coatings; structural clay products; refractories; whitewares.

CHEMICAL TECHNOLOGY 421a
Chemical engineering and process equipment; chemistry of materials such as wood, paper, textiles, and coal and petroleum by-products; petroleum refining.

CHEMISTRY—GENERAL, INORGANIC, AND PHYSICAL 424a

CHEMISTRY—ORGANIC 431a

CLEANING, FINISHING, AND COATINGS—METALLIC 387a
Buffing and polishing; chemical and electrochemical cleaning and coatings; diffusion, dip, oxide, sprayed, weld-deposited, and vapor-deposited coatings; cladding.

CORROSION 398a
Theory, measurement, and prevention (except by means of coatings).

DESIGN 420a
Design of parts, equipment, and structures (except when auxiliary to other subjects); theoretical stress analysis.

ELECTRICITY AND ELECTRONICS 449a
Electrical and electronic theory, circuits, equipment, and applications (except when auxiliary to other subjects).

FOUNDRY PRACTICE 378a
Melting; casting; pouring; rigging; shakeout and trimming; molding; core and pattern making; metallurgical control.

FUEL TECHNOLOGY 411a
Solid, liquid, and gaseous fuels—their properties and combustion; carbonization, liquefaction, and gasification of solid fuels; synthetic fuels. (For combustion in engines, see Section 21.)

GRAPHIC ARTS 452a
Printing and decorating processes, equipment, and materials; book manufacture; photography.

HEATING, DRYING, AND AIR CONDITIONING 413a
Space heating; cooling; humidification; materials drying and heating; equipment such as ovens, boilers, furnaces, heat pumps, and auxiliaries.

LUBRICATION AND FRICTION 419a
Lubricants and lubricating methods; friction fundamentals; nonmetallic bearing materials; oil filtration; lubricating-system design.

METALLOGRAPHY AND PRIMARY STRUCTURES 390a
Microscopy, diffraction methods and other techniques; phase diagrams; nuclear and crystal structures; microstructures; macrostructures. (For structures resulting from transformation or deformation see Sections 11 and 13, respectively.)

METALS—FABRICATION AND USES 409a
Miscellaneous fabrication procedures; applications of metals, alloys, and specific processes.

SECTION INDEX (Continued)

METALS—MECHANICAL PROPERTIES AND TESTS 394a
Elasticity and plasticity; stresses and stress analysis; fracture; creep; shear; hardness; fatigue; wear resistance; deformation structures.

METALS—PHYSICAL PROPERTIES AND TESTS 393a
Mass, thermal, thermodynamic, chemical, electrical, magnetic, and optical properties.

METALS—PRIMARY WORKING 380a
Preparation for working; forging; rolling; extrusion; swaging; tube making; wire and rod drawing; slitting, sawing, shearing, etc.

METALS—SECONDARY WORKING 381a
Drawing; impact extrusion; forming; stamping; machining and machinability; grinding; honing and lapping; strain hardening; shot peening; flame cutting.

METALS—SMELTING, REDUCTION, AND REFINING 375a
Smelting and reduction of ores; distillation of metals; electrolytic winning and refining; thermit processes; cementation; amalgamation; carbonyl, halide, and hydride processes; ingot practice.

METALS—THERMAL TREATMENT 386a
Homogenization; annealing; normalizing; patenting; quench, precipitation, and case hardening; tempering; stress relief; cold treatment; heating and cooling media. (For effects of thermal treatment, see Sections 11, 12, and 13.)

METALS—TRANSFORMATIONS AND RESULTING STRUCTURE. 391a
Diffusion; nucleation and grain growth; recovery and recrystallization; allotropic transformations; precipitation; eutectoid reactions; other solid-state reactions; liquid-phase reactions; solid-liquid, vapor-solid, and vapor-liquid reactions.

METALS—WELDING OR JOINING 383a
Welding; soldering; brazing; weldability and weld tests; bonding metals to nonmetals; adhesive bonding; mechanical fastening.

MISCELLANEOUS 454a
Research and research organizations; general metallurgical articles; mathematics; medical research; patent law; other unclassified subjects.

ORE AND MATERIAL BENEFICIATION 373a
Preparation and concentration of solid materials; roasting; calcining; sintering; nodulizing; briquetting; mineralogy.

PAINTS, VARNISHES, LACQUERS, AND ENAMELS 438a
Organic and inorganic coatings (except ceramic coatings); their composition, properties, application, and testing.

PHYSICS 441a
Theory and practice (except as covered in other sections). Includes aerodynamics; biophysics; flow of gases and liquids; deformation of solids; heat transfer; nucleonics; semiconductivity and superconductivity; ultrasonics; etc.

PLASTICS AND HIGH POLYMERS 433a
Polymerization; properties; testing; processing methods and equipment; compounding. (Does not include rubbers and surface-coating resins.)

POLLUTION AND WASTES 410a
Sampling, analysis, collection, prevention, and treatment of gaseous and liquid wastes, including smoke, fumes, odors, fly ash, dusts, aerosols, sewage, and industrial wastes; by-product recovery; meteorological, topographical, and biological effects.

POWDER METALLURGY 383a
Powder production and properties; mixing; compacting; sintering; post-sintering operations.

PRIME MOVERS 414a
Reciprocating engines; turbines; jet engines; rockets; locomotives; auxiliary equipment; power from atomic fission.

RUBBERS AND OTHER ELASTOMERS 437a
Polymerization; properties; testing; processing methods and equipment; compounding.

STATISTICS AND ECONOMICS 453a
Natural resources; supplies; production and cost data; articles on economic trends.

BATTELLE TECHNICAL REVIEW

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1. ORE AND MATERIAL BENEFICIATION

6780* The Influence of Gases on the Flotation of Non-sulfide Minerals. (In Russian.) I. N. Plaksin and E. M. Chaplygina. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 21, 1952, p. 451-453.

Various ores and minerals were treated with oxygen, nitrogen, and air before flotation. Results are discussed and charted for quartz, fluorite, calcite, iron oxides, copper ores, etc.

6781* The Precision of Basic Technological Indices and Engineering Calculations for Ore-Extraction Processes. (In Russian.) L. I. Baron. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Sept. 1951, p. 1346-1355.

Variations of important indices characterizing extraction and treatment of ores were investigated. Degree of influence of various factors and groups of factors was studied. Precision of various empirical approximations used in the mining industry is calculated. Data are charted. 12 ref.

6782* Contemporary State of Flotation Theory. (In Russian.) I. N. Plaksin. *Vestnik Akademii Nauk SSSR*, v. 21, Apr. 1951, p. 28-34.

Presents a review and discussion of mineral flotation theory with emphasis on Soviet developments.

6783* Rare Earths: Their Ores and Their Applications. (In Portuguese.) Othon H. Leonardos. *Boletim da Associaçao Brasiliera de Metais*, v. 7, Oct. 1951, p. 494-519; disc., p. 519.

Discusses the above with respect to methods of production and properties and application in metallurgy and other branches of science and technology. Special attention is given to Th, Ce, and the monazite deposits of Brazil. Table gives chemical compositions of 49 different rare-earth ores. 39 ref.

6784 Canada's Chromium Problems; Low-Grade Domestic Ores Investigated. *Chemical Age*, v. 66, Apr. 5, 1952, p. 513-514.

Briefly discusses a survey of the above conducted by the Extractive Metallurgy Section, Div. of Mineral Dressing and Process Metallurgy, Mines Branch, Ottawa.

6785* Oily Collectors in Coal Flotation. R. M. Horsley. *Colliery Guardian*, v. 184, Apr. 24, 1952, p. 509-512.

Considers contact-angle measurements in regard to floatability and various coal types. Gives percentage recovery for 5 coal types using emulsified and non-emulsified Nujol as a collector. Tables.

6786 How to Calculate Power Loads for Thickeners. Roman Chelminski. *Engineering and Mining Journal*, v. 153, Apr. 1952, p. 89-91.

Details of the above are presented and graphically interpreted.

6787 Modern Coal Processing Equipment at New Plant Achieves Uniform Quality. *Industrial Heating*, v. 19, Apr. 1952, p. 640, 642, 644, 646, 648, 650.

Describes new $5,000,000 plant for washing, cleaning, and grading raw coal, recently placed in operation by Hanna Coal Co., Pittsburgh. It is the largest coal-cleaning plant in the commercial bituminous industry. Mentions facilities to avoid stream and air pollution. Photographs.

6788* New Developments in Ore Dressing in 1951. James J. Bean. *Mines Magazine*, v. 42, Mar. 1952, p. 51-52, 68.

Includes iron ore beneficiation; new types of equipment; cyclone separating process; magnetic separation; flotation plants; sulfur ore treatment; cobalt treatment; and miscellaneous minerals and processes.

6789* Uranium Production in Colorado Plateau Area. Frank H. MacPherson. *Mines Magazine*, v. 42, Mar. 1952, p. 53-54, 88.

6790* Mining and Milling at Reocin, Spain. T. E. Abrey. *Mine & Quarry Engineering*, v. 18, Apr. 1952, p. 117-122.

A detailed survey and analysis of the above with specific reference to mine owned by a Belgian Co. Ore being worked at present contains Zn, Pb, Fe, MgO, and lime.

6791 Taconites Beyond Taconites. N. M. Levine. *Mining Engineering*, v. 4, Apr. 1952, p. 361-363.

Discusses possibilities of using low-grade iron ores, and exemplifies by presenting a study of deposits in Iron County, Wisc. Gives tentative metallurgical flowsheet.

6792 Solid Surface Energy and Calorimetric Determinations of Surface-Energy Relationships for Some Common Minerals. A. Kenneth Schellinger. *Mining Engineering*, v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 369-374.

Briefly reviews methods used to determine surface energies on solids. Presents new data on surface-energy relationships for quartz, glass sand, crystalline NaCl, specimen-grade pyrite, and specimen-grade calcite, obtained by a technique combining calorimetric determination of energy and BET surface area measurement. Tables, graphs, apparatus diagram. 19 ref.

6793 Radiotracer Studies of the Action of Dithiophosphate In the Selective Flotation of Galena and Sphalerite Using $CuSO_4$ and NaCN. C. M. Judson, A. A. Lerew, R. B. Booth, J. S. Kennedy, and G. L. Simard. *Mining Engineering*, v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 375-380.

A study of the distribution of dithiophosphate during selective flotation of galena and sphalerite from quartz in a Fagergren machine, using NaCN to depress and $CuSO_4$ to reactivate the sphalerite. Single flotations of galena and sphalerite from quartz were studied.

6794 Some Dynamic Phenomena in Flotation. W. Philippoff. *Mining Engineering*, v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 386-390.

A possible mechanism for the attachment of a conditioned mineral particle to a rising bubble has been developed. The mechanism, as distinct from the static equilibrium, accounts for the more difficult flotation of fines and slimes, and supple-

†Prepared from books, journals, and other material received by the Battelle Memorial Institute Library.

1. *Ore and Material Beneficiation*

ments the probability calculations of Gaudin and of Sutherland. Tabular data. 22 ref.

6795 Manganese: Sources and Beneficiation. *Mining Engineering*, v. 4, Apr. 1952, p. 360.

A brief account of the present status of the above.

6796 Low Base Metal-High Silver Ores Give Better Smelter Returns With Pre-Cyanidation Treatment. R. R. Bryan. *Mining Engineering*, v. 4, May 1952, p. 464-468.

Describes the development of pre-cyanidation flotation by Cia. de Real del Monte y Pachuca, Pachuca Hgo., Mexico, and metallurgical results of pre-cyanidation flotation. Gives evaluation of flotation vs. straight cyanidation, and operating data. Tabular data.

6797* Heavy-Media Coal Washing Installations Using the Process of the Netherlands State Mines. (In French.) C. Krijgsman and P. Brichant. *Revue Universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie*, ser. 9, v. 95, Mar. 1952, p. 65-76.

Describes and diagrams a series of above plants now under construction. Gives details of the process and its theoretical bases. Performance data are tabulated and charted.

6798* The Magnetic Properties of Pyrrhotine (Magnetic Pyrite.) (In Russian.) S. V. Lipin. *Zapiski Vsesoiuznogo Mineralogicheskogo Obshchestva*, ser. 2, v. 80, Oct.-Dec. 1951, p. 258-268.

A study was made of the above iron ore. The influence of ratio of S to Fe and of the degree of homogeneity were determined.

Miscellaneous Publications

6799 Iron-Ore Beneficiation — Present Practices and Trends. Stephen E. Erickson. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1951, p. 4-12; disc., p. 12-18. (TN713 Am35p)

Includes 7 typical flow diagrams.

6800 Design of a Recent Sintering Plant. C. G. Bigelow. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1951, p. 103-110; disc., p. 114-121. (TN713 Am35p)

The sintering-plant installation described has a rated capacity of 2400 net tons of sinter a day, consists of two 72-in. by 118-ft. 16-windbox Dwight-Lloyd-type machines together with necessary auxiliary equipment. Primary function of the plant is to sinter the current production of flue dust from the blast furnaces, as well as stock dust, filter cake recovered from the blast furnace, gas-washing water, rolling-mill scale, and fine ore.

6801 Recent Advances in Sintering-Plant Design and Operation. M. F. Morgan. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1951, p. 91-103; disc., p. 114-121. (TN713 Am35p)

Diagrams and illustrations show principally equipment designed and constructed by Arthur G. McKee and Co., for sintering of iron ores.

6802 Testing of Iron Ores and Agglomerates Related to Blast-Furnace Use. R. J. Morton. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1952, p. 122-134; disc., p. 142-152. (TN713 Am35p)

The work described has been directed mainly to methods of testing iron ores and agglomerates for strength, decrepitation, porosity, and reducibility, in an attempt to develop significant testing procedures. Apparatus is diagrammed and illustrated; data are tabulated and charted.

6803 Physical Tests and Results on Some Agglomerated Iron Ores. F. M. Hamilton. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1952, p. 135-140; disc., p. 142-152. (TN713 Am35p)

Reviews a portion of a recent AIME paper (*Mining Engineering* v. 187, Dec. 1950, p. 1275-1282), plus some additional information obtained since that paper was prepared. Sampling, laboratory-crush and tumbler tests, and laboratory-reducibility procedures and apparatus are described. Typical data are charted.

6804 A Strength Test for Sinter. Reed W. Hyde. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1952, p. 141-142; disc., p. 142-152. (TN713 Am35p)

The method described was developed to give comparative strength data by a simple procedure that does not require special testing equipment. It has been used at Sintering Machinery Corp.'s testing plant for some time.

6805 Flotation and Electrostatic Separation of Beach Sands From South Woodburn, N.S.W. Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne, Joint Investigation 379, 7 pages. (T177 M48i)

Presents results of investigation of the above. Zircon and rutile were recovered, in reasonably good yields and grades.

6806 Concentration of Tin Ore From the Belmont Tin Mine, Torrington District, N.S.W. Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne, Joint Investigation 387, June 15, 1951, 5 pages. (T177 N48i)

Presents data on classification, tabling, and magnetic concentration of the above.

6807 Concentration of Tin Ore From Mt. Masson, N.T. Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne, Joint Investigation 393, 4 pages. (T177 M48i)

Presents data on classification, tabling, and magnetic concentration of the above.

6808 The Occurrence of Lead in Blast Furnace Slag at Broken Hill Associated Smelters, Port Pirie, South Australia, and Its Recovery by Flotation. Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne, Joint Investigation 397, July 10, 1951, 12 pages. (T177 M48i)

Presents results of investigation of the above. Includes details of analytical procedures developed, and of mineragraphic examination. Flotation and magnetic-concentration test data are tabulated. Economic and technical pros and cons are discussed.

6809 Metallic Mine Mechanization to Increase Recovery; Mining and Concentrating in Sweden. Sven Dalhammer. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951. p. 110-113; disc., p. 166-170. (HC13 Un3p)

Discusses advantages of mechanization to get better recovery and higher-grade concentrates. Some sink-float plants are mentioned. Crushing or grinding in iron-ore concentration is discussed. The Loewenhielm dewatering device is mentioned. Examples of the recovery of by-products discussed include flotation of apatite and flotation of pyrite in both sulfide and iron-ore concentration.

6810 New Processes for the Utilization of Low Grade Ores. R. W. Diamond, C. O. Swanson, and B. P. Sutherland. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951. p. 140-146; disc., p. 166-170. (HC13 Un3p)

Concerned mainly with cost factors. Low-grade ores are divided into two classes; simple ores of low metal content, and complex ores. In the first type, crushing and grinding form an important part of the total cost. The general trend is towards larger-sized units, together with adoption of automatic controls and greater mechanization in handling of materials. In the separation processes, gravity methods are especially suitable. In treatment of complex low-grade ores, use of induced superficial oxidation, a fluidized bed for roasting and calcina-

tion, controlled crystallization of mattes, improved reagents in flotation, and electrostatic separation are some of the advances recently made. Discussion of metallurgical methods is limited to recovery of Pb and Zn from ores, residues, and slags. 33 ref.

6811 New Processes for the Utilization of Low-Grade Ores. John D. Sullivan. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 146-152; disc., p. 166-170. (HC13 Un3p)

Reviews the above. Tables and graphs show progress in various lines over the years. 16 ref.

6812 Economic Mineral Dressing as the Preliminary Condition for Inexpensive Large-Scale Mining; Methods of Utilization of Low-Grade Iron Ores. Ernst Bierbrauer. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 163-165; disc., p. 166-170. (HC13 Un3p)

In order to beneficiate the siderite ore of the Styrian Iron Mountain in Austria, the Institute of Mineral Dressing of the Montanistic University at Leoben has developed a separation process for coarse ores which combines the separating efficiency of the sink-and-float process with the advantage of low operating costs. This process is something intermediate between jigging and heavy-media separation. By using a heavy pulp with a specific gravity of only 1.6-1.8, the buoyancy of which is also increased by high viscosity, a standard jig is able to treat coarse ores from 40 to 150 mm. in size and more without raising the normal plunger velocity. In addition, replacement of jig water by a heavy pulp leads to a selectivity nearly as high as that of the float-and-sink method, and to an unusually large capacity.

6813 Magnesia and Magnesium From Sea-Water. P. Litherland Teed. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 257-261; disc., p. 265-268. (HC13 Un3p)

Reviews history of above in Great Britain. Two different processes used are described, and their advantages and disadvantages pointed out. Application trends of the metal are surveyed.

6814 Concentration of Oxide and Silicate Manganese Ores From Siskiyou and Mendocino Counties, Northern California. G. M. Potter, W. G. Sandell, and K. C. Vincent. U. S. Bureau of Mines, Report of Investigations 4849, Mar. 1952, 14 pages. (TN21 Un3r)

Presents results of gravity concentration, flotation, and sintering tests on above ores of 3 types from 3 distinct districts.

6815 Mineral Dressing Investigation of Titanium Ore From the Christy Property, Hot Springs County, Ark. M. M. Fine and D. W. Frommer. U. S. Bureau of Mines, Report of Investigations 4851, Mar. 1952, 7 pages. (TN21 Un3r)

Flotation research on samples of residual brookite ore and a drill-hole composite from above property showed that high-grade flotation concentrates can be produced. Success of the flotation depends, to a considerable extent, on an adequate preflotation treatment including an alkaline blunge and nearly complete slime removal from the ground ore. The brookite can be activated with a heavy metal salt and floated with a soluble soap. Final concentration of the brookite is effected by cationic flotation in an acid circuit. Possibility of recovery of by-product vanadium is indicated. 10 ref.

6816 Investigation of Encampment Vermiculite Deposits, Carbon County, Wyo. W. A. Young. U. S. Bureau of Mines, Report of Investigations 4857, Mar. 1952, 15 pages. (TN21 Un3r)

Includes section on beneficiation tests using a variety of techniques.

See also:
6828 (Ge ore beneficiation)
6830 (new chemical process for ore treatment)
8327 (conservation in milling of ores)

2. METALS—SMELTING, REDUCTION, AND REFINING

6817* Laws of the Common Discharge of Ions and the Theory of Electrolytic Refining of Metals. (In Russian.) V. L. Kheifets and A. L. Rotinia. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 21, 1952, p. 423-426.

Presents a theoretical discussion of the above. Comparisons are made with experimental curves for several solutions. 15 ref.

6818 Method for Freeing Zirconium of Common Impurities and for Preparing Zirconium Sulfate and Oxide. W. Stanley Clabaugh and Raleigh Gilchrist. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2104-2105.

Presents a method of purification based on the sulfate.

6819* Metallurgy and Science. Robert F. Mehl. *American Scientist*, v. 40, Apr. 1952, p. 229-259.

A description for the nonspecialist, of the science of metals and of metallurgical engineering based on an account of the manufacture of alloy steel SAE-4340. Considers chemical theory of steelmaking and heat treatment. Diagrams, graphs, and photomicrographs.

6820* Industrial High Vacuum and Its Application to Some Metallurgical Problems. J. P. Baxter. *Australasian Engineer*, Feb. 7, 1952, p. 76-79.

Discusses high-vacuum methods and the design problems they pose for the engineer. Considers individual examples of vacuum metallurgy.

6821 Making Pig Iron Without Coke. D. J. O. Brandt. *Australasian Engineer*, Feb. 7, 1952, p. 111-112, 115, 117, 119, 121, 123.

6822* Bases of Calculation and Choice of Burden in Openhearth Furnaces for Production of Common Steel. II. (In Portuguese.) *Boletim da Associaçao Brasiliera de Metais*, v. 7, Oct. 1951, p. 471-493.

Discusses the above from the theoretical, practical, and economic points of view. Includes extensive tabular data.

6823* Principles Used in the Pyrometallurgical Processes of Lead Refining. (In Portuguese.) Tharcisio D. de Souza Santos. *Boletim da Associaçao Brasiliera de Metais*, v. 7, Oct. 1951, p. 527-559; disc., p. 559.

Examines principles of various processes used for eliminating impurities existing in primary and secondary lead. Includes table and a large number of phase diagrams for binary Pb alloys, reproduced from "Metals Handbook" and other sources. 35 ref.

6824* Development of Processes for Extractive Metallurgy of Copper in View of the Possibilities of Their Application in Brazil. (In Portuguese.) Tharcisio D. de Souza Santos. *Boletim da Associaçao Brasiliera de Metais*, v. 7, Oct. 1951, p. 560-572.

13 references.

6825* Some New Metallurgical Processes for Tin in View of the Possibilities of Their Application in Brazil. (In Portuguese.) Tharcisio D. de Souza Santos. *Boletim da Associaçao Brasiliera de Metais*, v. 7, Oct. 1951, p. 573-581.

6826 The "Gold" in Silvery Iron. *Business Week*, Apr. 12, 1952, p. 106-108.

Describes operation and expansion plans at Globe Iron Co., Jackson, Ohio.

6827 Silicothermic Magnesium Comes Back. Elliot Schrier. *Chemical Engineering*, v. 59, Apr. 1952, p. 148-149.

A report on the present status and a description of the above process. It is not competitive with electrolytic Mg, but is being used to meet demands for production. The process is being improved; continuous operation is under study.

6828 Germanium's Electronic Upsurge. Joseph A. O'Connor. *Chemical Engineering*, v. 59, Apr. 1952, p. 158-160, 290.

Gives historical details, and describes production of Ge from Zn ore. Includes brief account of beneficiation process.

2. *Metals—Smelting, Reduction, and Refining*

6829 Oxidation-Reduction: News in Inorganics. *Chemical Engineering*, v. 59, Apr. 1952, p. 161-168.

A survey of the current status of the above comprising brief accounts of such topics as use of oxygen in boosting production of steel and S; hydrazine; ozone; nitrogen tetroxide; production of high pressure, low-cost ammonia; S from H_2S; reduction furnaces; producing the "rare" metals by reduction with hydrogen and metals and by silicothermic and electrolytic reduction; and direct reduction in a fluidized bed. 12 ref.

6830 Chemical Ore Reduction Process May Pay Out in Three Years. *Chemical and Engineering News*, v. 30, May 19, 1952, p. 2104-2105.

Outlines new high-temperature, high-pressure, all-chemical process for recovery of Ni, Co, Cu, or Mn from ore or scrap, just announced by Chemical Construction Co., a subsidiary of American Cyanamid. Ore concentrates are made by conventional flotation methods, then leached in H_2SO_4 under pressure to oxidize the sulfur to sulfate. The gangue is filtered out along with the insoluble arsenic compounds and a cation-exchange reaction or cementation step removes the copper salts. The solution is made ammoniacal and reduced with hydrogen under pressure. By altering temperatures and pressures of the reduction it is possible to bring down one metal at a time in order of their appearance in the electromotive series. It is believed impractical to recover any metal above Zn in the electromotive series. Three refineries already are being built to utilize the process: Howe Sound Mining Co.—cobalt refinery near Salt Lake City; National Lead Co., Fredericktown, Mo.; and Sherritt Gordon Mines, Edmonton, Alberta, Canada—both to produce Ni, Co, Cu, and fertilizer-grade $(NH_4)_2SO_4$. Economic advantages may even make it advisable to scrap existing facilities.

6831* Study of the Characteristics of Steel Produced in the Basic Converter With a Pure Oxygen Blast According to a New Austrian Process. (In French.) H. Hauttmann. *Circulaire d'Informations Techniques*, v. 9, Apr. 1952, p. 449-509. (Translated from *Mitteilungen aus der Forschungs- und Versuchsanstalt der Vereinigten Österreichischen Eisen- und Stahlwerke Linz-Donau*, Dec. 1951, 38 pages.)

Describes the above in which the raw materials are charged in a 15- or 25-ton converter, the bottom of which contains no hole. The converter being placed in a vertical position, a lance is introduced through which the pure oxygen is blown in under pressure of 15 kg. per sq. cm. This pressure creates sufficient agitation so that the end of the lance need not be immersed in the bath, hence is not subject to the usual rapid deterioration. Diagrams, photographs, tables, and graphs.

6832* Use of the Triplex Process in Iron and Steel Production: Cupola, Acid Converter, Electric Arc Furnace. (In French.) M. Sautereau. *Circulaire d'Informations Techniques*, v. 9, Apr. 1952, p. 517-526.

Discusses the economic aspects of melting steel in the cupola, of decarburizing the melt in the converter, and then of refining the melt in an electric-arc furnace or of completing the process of melting and refining in an electric-arc furnace. Tabular data.

6833* The Cathodic Reduction of Copper Oxide. (In French.) Pierre Jolibois and André Sancelme. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 3, 1952, p. 1007-1010.

The electrolytic reduction of copper oxides was studied. Existence of two new crystalline varieties of Cu, one having the structure of CuO, and the other that of Cu_2O, was established by X-ray methods.

6834 Arc Melting of Zirconium Metal. H. L. Gilbert, W. A. Aschoff, and W. E. Brennan, II. *Journal of the Electrochemical Society*, v. 99, May 1952, p. 191-193.

In arc-melting Zr metal with a tungsten electrode, W appears in non-uniform amounts throughout the ingot. To eliminate this, use of consumable electrodes of Zr sponge is proposed. The arc is stabilized with a small amount of Mg metal added to the Zr sponge used in making up the electrodes. A water-cooled Cu sleeve is used as a melting section in the arc-melting furnace. Melting is done under an inert atmosphere of A or He. Metallographic and radiographic studies show the finished ingots to be sound. 12 ref.

6835 A Technique for Eliminating Crucibles in Heating and Melting of Metals. D. M. Wroughton, E. C. Okress, P. H. Brace, G. Comenetz, and J. C. R. Kelly. *Journal of the Electrochemical Society*, v. 99, May 1952, p. 205-211.

Method of heating and melting metals without a crucible, by suspension in space with an electromagnetic field, is described. The required field was generated by applying high-frequency a.c. to 2 coaxial coils connected in series opposition. Stable levitation and heating of various metals in the solid state was obtained between the coils in the vicinity of the common axis, both in air and in a vacuum. Diagrams and photographs.

6836 Rare Earths Improve Properties of Many Ferrous Metals. Parts 1 and 2. W. E. Knapp and W. T. Bolkcom. *Iron Age*, v. 169, Apr. 24, 1952, p. 129-134; May 1, 1952, p. 140-143.

Presents information on use and effects of "Lan-cer-amp," reviews history of comparable additions, and offers hypotheses in explanation of its behavior. Lan-cer-amp containing more La than regular misch metal is being used as ladle addition in stainless, tool steel, alloy, and electrical steel grades. Not all benefits derived from rare-earth additions can be attributed to S reduction. Effect on N content may be more important. Gives effect on ductility and toughness of Cr-Ni-Mo. Lists properties of rare earths. 28 ref.

6837 High Vacuum Melting; Recent Continental Developments. A. J. Gibbs-Smith. *Iron and Steel*, v. 25, Apr. 1952, p. 141-142.

6838 Liquid Steel; Measurements and Recording of Temperature at Abbey Works. *Iron and Steel*, v. 25, Apr. 1952, p. 144.

6839 Cropping Losses Reduced by Electric Hot Topping. Tunis L. Holmes. *Iron and Steel Engineer*, v. 29, Apr. 1952, p. 120-122.

Describes a method for the above developed by the M. W. Kellogg Co. for steel ingots weighing up to 110,000 lb. Power consumption was 30-40 kwhr. per net ton. Grades of steel have been electrically hot-topped from plain-carbon steel through most of the stainless grades, valve steels, die steels, high-speed toolsteels and high-temperature super-alloys. The increase in yield has averaged between 5 and 8% with many figures showing even greater increases.

6840 Aerodynamic Factors Associated With the Wear of Open-Hearth Furnace Roofs. J. A. Leys and E. T. Leigh. *Journal of the Iron and Steel Institute*, v. 170, Apr. 1952, p. 336-342.

Flow conditions existing in a model of the furnace were investigated. Causes of wear are associated with high-velocity streams, and deposition of slag particles from such streams. Suggests steps to minimize wear. Photographs and diagrams. 16 ref.

6841* Cobalt Metallurgy at the Union Miniere of Upper Katanga. (In French.) *Journal du Four Electrique et des Industries Electrochimiques*, v. 61, Jan.-Feb. 1952, p. 7-9.

Discusses Co metallurgy in Katanga (Belgian Congo) with respect to the development of pyrometallurgical and hydrometallurgical processes. Illustrated.

6842 Production at Garfield: World's Largest Copper Smelter. R. Thompson. *Journal of Metals*, v. 4, May 1952, p. 456-459.

Gives details of equipment and processes for the above. Current daily production is 775 tons of Cu in anode shapes.

6843 "Residues to Metals." *Metal Industry*, v. 80, Apr. 25, 1952, p. 329-330.

L. H. Dowling and Sons, a British firm, claim to have solved the problem of extracting the total metallic content from nonferrous residues. It can treat residues containing over 15% metallics. Test results obtained on some brass residues are tabulated. Appearance of various fractions of original material and concentrates is illustrated. No details of the process are given.

6844 Blast Furnace Practice. Raw Materials Problem. IX(c). Charles E. Agnew. *Steel*, v. 130, Apr. 21, 1952, p. 98, 100, 103-104, 107; Apr. 28, 1952, p. 84, 87-88, 90.

Apr. 21 installment points out that early ironmasters using local ores recognized the importance of stock preparation in

the shaft before delivery to the smelting zone. Substitution of Lake ores for native ores and the structural strength of coke led to higher blast furnaces and faster blowing. Advantage of Lake ores are traced to particle-size effects. Apr. 28 installment discusses problems connected with use of Mesabi ores, which contain more fines than Old Range ores. Use of concentrated ores is also discussed, showing effects on productive capacity and fuel consumption. (To be continued.)

6845* Pre-Refining by Means of Pure Oxygen of Bessemer Melts of High Silicon Content. Application to Bessemer Melts Produced in the Acid Blast Furnace. P. Leroy. *Revue de Métallurgie*, v. 49, Mar. 1952, p. 231-241.

Discusses problems involved in blast-furnace processing of several French iron ores. Examines critically the various possible solutions and gives data on use of pure oxygen as indicated above. Blowing technique is described. Tables and graphs. 23 ref.

6846* Carburization With Oil in an Openhearth Furnace With Regenerative Gas and Air Preheating. (In German.) Erwin Fischer. *Stahl und Eisen*, v. 72, Mar. 13, 1952, p. 288-290.

Because of shortness of coke-oven gas, oil was added during the winter months without putting the gas producers into operation. Cleaned blast-furnace gas was used as carrier gas. Experiments on a 120-ton tilting furnace with all-basic lining and a composite gas of a calorific value of 2200 kcal. when charging cold or hot o.h. pig iron are described. Diagrams, graphs, and illustrations.

6847* Use of Dolomite Bricks in Openhearth and Electric-Arc Furnaces. (In German.) Fritz Gareis. *Stahl und Eisen*, v. 72, Mar. 27, 1952, p. 345-347.

Troubles initially encountered in laying the dolomite bricks on account of shrinkage and infiltration. Trials on stopping ends, pillars, roofs, and ports. Good behavior in hearths, pillars, and arches of electric-arc furnaces.

6848* Processing Speculum Metal. (In German.) Joseph Blanderer. *Zeitschrift für Erzberghau und Metallhüttenwesen*, v. 5, Mar. 1952, p. 90-95.

Above material consists largely of Cu, Sn, and Sb, plus varying, but low, percentages of Pb. It is a typical byproduct of the smelting of Pb and Sn ores. Describes new process, applied in Germany, by which it oxidized in a 2-step process, then separated into the component metals by a series of chemical operations.

Miscellaneous Publications

6849 Steel Desulphurization With Injected Carbide. S. F. Carter. American Foundrymen's Society, Preprint 52-29, 1952, 5 pages. (TS200 Am35t)

Method described reduces S in small acid-electric heats from 0.085 to 0.045%, 0.075 to 0.038%, 0.030 to 0.019%, etc. S removal in basic heats has been accelerated by the same treatment, which involves injection of fine carbide into the furnace bath with inert gas. Cost analysis.

6850 Statistical Analysis Becomes of Age—An Example of Analysis of Blast-Furnace Production Data. Donald S. Leckie. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1952, p. 153-157; disc., p. 157-164. (TN713 Am35p)

Surveys various methods of statistical analysis, including use of IBM equipment.

6851 Performance of the Carbon Hearth. H. M. Kraner and K. A. Baab. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1952, p. 165-167; disc., p. 167-173. (TN713 Am35p)

Presents detailed tabular data on operating results to date, obtained by various blast-furnace operators.

6852 Relative Reducibility of Ores and Agglomerated Materials in Various Stages of Oxidation. Carl Ludwig. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1952, p. 173-180; disc., p. 180-186. (TN713 Am35p)

Concludes, on the basis of experiments, that when the physical structures of fine-particle agglomerates (−100) of the 2 iron oxides are of similar dimension and packing, magnetite is as easy or easier to reduce than hematite at about 900°C. It appears that particle-size distribution—i.e., close or loose pack—does not influence reaction rate to an appreciable degree when above fines are compared. Influence of reaction temperature on the relative reducibilities of the 2 oxides has not been explained theoretically. Data are charted.

6853 Results Obtained From Use of High-Magnesia Slags. L. F. Moore. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1952, p. 187-193; disc., p. 193-199. (TN713 Am35p)

Presents the results obtained from use of high- and low-MgO slags in the operation of 2 blast furnaces of comparable size. Data are tabulated and charted.

6854 Procedure Used in Quenching and Digging Out a Blast Furnace and Some Results. K. C. McCutcheon, W. E. Marshall, and H. C. Barnes. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1952, p. 200-218; disc., p. 218-227. (TN713 Am35p)

Describes and illustrates methods followed in the above after completion of an experimental run using pelletized fine magnetite concentrates.

6855 Operation of the Sheffield Steel Corporation's Blast Furnace, Houston, Texas. F. C. Davies. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1952, p. 228-239; disc., p. 239-243. (TN713 Am35p)

Discussion covers 2 periods during World War II, and from July 10, 1947, to Dec. 31, 1950. Tables, graphs, and illustrations.

6856 Oxygen Content of Liquid Iron and Solubility of Oxygen in Solid Iron. W. A. Fischer and H. vom Ende. Henry Brutcher, Translation No. 2742, 25 pages. (From *Archiv für das Eisenhuttenwesen*, v. 21, Sept.-Oct. 1950, p. 297-304.)

Previously abstracted from original.

6857 Reduction of Iron Ores and Sinters. L. M. Tsylev. Henry Brutcher, Translation No. 2755, 10 pages. From *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, May 1948, p. 673-680.)

Previously abstracted from original.

6858 Evaluation of Properties of Blast-Furnace Coke. F. Brytus. Henry Brutcher, Translation No. 2802, 4 pages. (Condensed from *Hutnik*, v. 17, July-Aug. 1950, p. 183-189.)

Previously abstracted from original.

6859 Improved Basic Bessemer Steel. Battelle Translation. (From *Handelsblatt*, v. 6, Dec. 5, 1951, p. 3.)

Differences in properties, applications, and distribution of production in Germany of basic Bessemer and openhearth steel. Means of improving the quality of Bessemer steels up to that of openhearth types are discussed. Considers economic advantages.

6860 Conservation in Production of Iron and Steel. Clyde Williams. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 172-176; disc., p. 204-210. (HC13 Un3p)

Reviews past progress and future trends in technical developments which aid in conservation of depleted raw materials and in obtaining maximum production possible from present facilities.

6860a Ideas on the Future Production of Iron and Steel. Robert Durrer. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 180-182; disc., p. 204-210. (HC13 Un3p)

Recommends use of high-percentage oxygen instead of atmospheric air both for smelting and for converting. Smelting would

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be done in a low-shaft furnace, a type said to make less exacting demands, both chemically and physically, on raw materials than does the ordinary blast furnace. The metal extracted by this method of smelting, insofar as it is used for steel manufacture, need no longer be a pig iron in the present-day sense of the word, but merely an intermediate metallic product yielding steel on being converter-blown with high-percentage oxygen; the heat produced in this process would be sufficient, if all the intermediate metal were treated in this way, to melt down all the scrap iron at present generally regenerated in the openhearth furnace with heavy consumption of fuel.

Books

6861 The Manufacture of Iron and Steel. Vol. 2. G. Reginald Bashforth. 1951. 461 pages. Chapman & Hall, Ltd., London. (TN705 B29m)

Covers the various processes and equipment, including fuels, instrumentation, refractories, and other auxiliary topics. Diagrams, illustrations, and chapter bibliographies.

See also:
6802 (testing Fe ores in relation to blast furnace use)
6803 (physical tests on Fe ores)
6810 (recovery of Pb and Zn from ores, residues, and slag)
7628 (dolomite bricks in the electric-arc furnace)
7637 (refractory practice in malleable duplexing)
8327 (conservation in production of metals)

3. FOUNDRY PRACTICE

6862 Standards for Rough Chipping and Removing Welds. Dean Van Order. *American Foundryman*, v. 21, Apr. 1952, p. 120-124.

Describes a timestudy system for the above, and a recording minute meter. Diagrams and tabular data.

6863 Practical Aspects of Olivine as a Molding Material. John Sissener and Bjorn Langum. *American Foundryman*, v. 21, Apr. 1952, p. 138-142.

Describes above. Presents data on properties and performance in steel- and iron-casting as used in Norway. Technically advantageous for manufacture of Mn and Cr-Ni steel. Chief reason for use is in the presumed diminishing of silicosis risk. Equilibrium diagrams and photographs. 11 ref.

6864 Risering Castings. J. B. Caine. *American Foundryman*, v. 21, Apr. 1952, p. 143-149.

Summarizes recent work on scientific risering. Discusses difficulties with use of closely-spaced risers required to meet feeding distances. Gives methods to overcome these difficulties and to enable the foundry to produce castings free from dispersed shrinkage with minimum number of reasonably-sized risers and an acceptable yield. Diagrams and graphs. 12 ref.

6865* Observations on Dimensional Defects in Sand-Cast Pieces. (In French.) René Chion. *Fonderie*, Jan. 1952, p. 2763-2773.

Discusses the above with respect to nature of the equipment, resistance of the equipment and the mold, quality of the manpower, shrinkage, and forcing. Includes schematic drawings.

6866* A Complex Precision Casting. (In French.) *Fonderie*, Jan. 1952, p. 2774-2778.

Discusses the production of a steam-heated vat, of high-grade cast iron, intended for the chemical industry. It includes a flange: a cylinder; a convex bottom; 5 bosses including a center one; a small pipe branch; 4 grooves connecting the 5 bosses; 4 external grooves, and 3 steel coils for heating. Includes photographs and diagrams.

6867* Possibility of Use of Light-Alloy Shell Molds. (In French.) *Fonderie*, Mar. 1952, p. 2851-2857.

Discusses economic problems involved in gravity casting of light-alloy molds. Diagrams and photographs.

6868* Green Sand Casting of Bronze. (In French.) *Fonderie*, Mar. 1952, p. 2858-2865.

Experiments on the above were made in order to determine the effects of abnormally high moisture contents and pressures. Diagrams, tables, and photographs.

6869 Magnesium Sand Foundry Technology. W. C. Newhams. *Foundry*, v. 80, May 1952, p. 144-149, 362, 364, 366.

Reviews developments in the industry since World War II, offering recommendations on melting, molding, gating and risering, and correction of defects.

6870 Operating a Basic Cupola. Sam F. Carter. *Foundry*, v. 80, May 1952, p. 150-153, 250, 252, 254, 256, 259-260.

Experience in commercial operation of a basic-lined cupola is described. Advantages and disadvantages of this type of cupola compared with acid practice, and properties of the metal produced, are discussed. Tabular data on comparative refractory performance and patching costs, basic mixes with varying slag basicity, special irons made in basic cupola, and properties in various diameter bars.

6871 Electric Furnace Melting for Steel Castings. John Howe Hall. *Foundry*, v. 80, May 1952, p. 160-161, 318, 320, 322, 327.

Discusses procedure in electric furnace operation. This includes application of the lining, and charging and melting methods. (To be continued.)

6872 Fifty-Year Reviews. *Foundry Trade Journal*, v. 92, Mar. 15, 1952, p. 9-33, 39-43, 49-55, 57-86.

A series of reviews written for the golden jubilee issue: "From the Editor's Viewpoint," V. C. Faulkner; "Five Hundred Years' Ironfounding Crammed Into 50 Years," J. J. Sheehan; "Evolution of the Equipment Industry," J. Blakiston; "Perpetual Interest of Non-Ferrous Research," G. L. Bailey; "Consolidation of Bronze and Brass Founding," F. Hudson; "Pipe-Dreams to Practice in Cast Iron Research," J. G. Pearce; "Phenomenal Growth in Light Alloys," E. G. West; "America Outstripped in Malleable Practice," F. D. Ley; and "Co-operation in Steelfounding," F. Rowe.

6873 Dust Problems in Foundries. *Foundry Trade Journal*, v. 92, Apr. 10, 1952, p. 379-384; Apr. 17, 1952, p. 421-423.

A general discussion of the above by several members at a meeting of Institute of British Foundrymen.

6874* The Preparation of Cement Forming Sands. (In German.) H. Gries. *Giesserei*, v. 39, Mar. 20, 1952, p. 121-127.

Discusses applicability of synthetic sands in sand casting, as well as economic significance of reuse of old sands. Various types of sand compositions are characterized, and their resistance to pressure and their gas permeability indicated. Methods of preparation of new and used sands are described. Data are tabulated and charted. 12 ref.

6875* High Frequency Baking of Foundry Cores by Capacitance Heating. (In German.) H. Derlong and C. Rauh. *Giesserei*, v. 39, Apr. 17, 1952, p. 179-181.

Development of method of baking cores with synthetic binders. Physical fundamentals of high-frequency baking. Effect of plate distance and drying time. Water content of the cores. Combinations of baking by high-frequency and infrared radiation. Trials with oil cores. Tables and graphs.

6876* Historical Notes on the Foundry Industry in the USSR. (In Russian.) Adolf M. Plesinger. *Hutnické Listy*, v. 7, Jan. 1952, p. 15-19.

Briefly traces the development of the Russian foundry industry. Lists principal activities of many leading metallurgists.

6877 Cut Mold Costs With Cement Sand. N. A. Jeppesen. *Iron Age*, v. 169, Apr. 17, 1952, p. 116-119.

Presents information on use of above, giving advantages.

6878 Novel Methods Used to Form Molybdenum. G. L. Miller. *Iron Age*, v. 169, Apr. 17, 1952, p. 122-124.

Methods used in the production of ceramic products, and techniques used in making hard-metal dies from tungsten carbide-cobalt powder have recently been successfully adapted for use in fabricating Mo metal. Methods are described and illustrated.

6879 Iron and Steel Castings; Production at Sprotborough Foundry. P. McA. Martin and J. A. Cooper. *Iron and Steel*, v. 25, Apr. 1952, p. 117-120.

6880 Bibliography of the Die Casting Process. Part VI. (Concluded.) Harold Bourassa. *Light Metal Age*, v. 10, Apr. 1952, p. 28.

6881 Metal Injection: A Reassessment of the Position With Regard to Die-Casting Dies. (Concluded.) **Parts I, II, III, IV, and V.** H. K. Barton. *Metal Industry*, v. 80, Feb. 22, 1952, p. 149-151; Feb. 29, 1952, p. 171-173; Mar. 7, 1952, p. 187-188; Mar. 14, 1952, p. 205-206; Mar. 28, 1952, p. 243-245.

Presents an analysis of metal flow into dies. Discusses effects of viscous shear and validity of statement that viscous shear results in the kinetic energy of the stream being partly transformed into heat. Outlines characteristics of the metal stream. Gives values of constants for the various alloy groups. Deals finally, with how flow within the cavity can be controlled by varying the shape, size and location of the gate, or gates, and how flow along the runners can be controlled so as to make the best use of the heat resulting from the degradation of kinetic energy. Tabular data.

6882* Aluminum Castings for Polished and Anodized Parts, Particularly for Metal Fittings. (In German.) Marie Buckeley-Liesegang and August Buckeley. *Metalloberfäche*, v. 6, sec. A, Mar. 1952, p. A33-A41.

Discusses the correct application for cast Al alloys. A series of casting defects and their causes are described; possibilities for eliminating the latter are indicated. Little-known surface treatments for metal fittings are suggested. Photographs and micrographs.

6883 A Contribution on the Metallic Mould Blowing Reaction. Kondic, G. Martin, and K. Bromage. *Metallurgia*, v. 45, Mar. 1952, p. 127-130.

A study of above shows that the reaction, which is essentially one of oxidation of the C in the mold material, can be treated quantitatively with a good approximation by using the thermodynamic data of substances involved in the reaction. By providing at the interface metals of comparatively higher affinity for O than that of C, the reaction can be reduced and "blowing" completely eliminated. Diagrams and photographs.

6884 Core Extraction Forces Required in Pressure Die Casting. W. M. Halliday. *Metallurgia*, v. 45, Mar. 1952, p. 132-134.

Discusses die and operating factors governing scale of gripping pressures between sides of a cored hole and core. Gives a rule whereby such pressures may be estimated at design stage.

6885 A Note on the Mechanism of Solidification of Horizontal Sand Castings. K. C. Adamson and J. B. Sayers. *Metallurgia*, v. 45, Apr. 1952, p. 163-168.

Above process was studied in Al and Al-Zn alloys by temperature measurements, pour-out tests, and examination of macrostructures. Concludes that macrostructure of the type of casting examined is mainly dependent on difference in specific gravity between primary crystallites and liquid melt. Table, graphs, and photographs. 23 ref.

6886* Non-Flammable Hydraulic Fluid for Die Casting Machines; A Report on Properties and Performance. *Precision Metal Molding*, v. 10, Apr. 1952, p. 46-47, 80, 106.

Deals with Monsanto Chemical Co.'s Phydraul F-9, a phosphate-based material.

6887* Materials and Methods Currently in Use as Lubricants for Die Casting Dies. *Precision Metal Molding*, v. 10, Mar. 1952, p. 77-81.

Surveys the above. (To be continued.)

6888* Technique of Melting and Casting Metals and Alloys in a High Vacuum. (In French.) W. Fischer and O. Winkler. *Revue de Métallurgie*, v. 49, Mar. 1952, p. 211-220.

Discusses the above process with respect to its fields of application, equipment, and the process itself. Includes diagrams and photographs.

Miscellaneous Publications

6889 Heat Flow in Moist Sand. Victor Paschkis. American Foundrymen's Society, Preprint 52-4, 1952, 6 pages. (TS200 Am35t)

The present report is an extension of work described in the 1951 report, to cover the case of an initial moisture content of 6%. Data are charted, tabulated, and discussed.

6890 Veining Tendencies of Cores. American Foundrymen's Society, Preprint 52-6, 1952, 5 pages. (TS200 Am35t)

Material presented in this Progress Report deals with factors that affect the presence of metal fins, not at the core parting, but on cored surfaces of castings. The study of veining is limited to iron castings. The Committee has established that veining can be produced or eliminated by selection of base sands, binders, metal pouring temperature, degree of ramming, degree of baking, percentage of binders, and, in some cases, moisture. Data are extensively tabulated and charted.

6891 Core Boxes From Core Plugs. James N. Mathias. American Foundrymen's Society, Preprint 52-7, 1952, 4 pages. (TS200 Am35t)

Describes the process of developing Al core boxes from wood or metal master core plugs. Discusses advantages to the pattern-shop previous to obtaining the casting. Shows photographically the pattern equipment furnished for use in the process as constructed by various pattern shops.

6892 Solidification of Nodular Iron in Sand Molds. R. P. Dunphy and W. S. Pellini. American Foundrymen's Society, Preprint 52-9, 1952, 7 pages. (TS200 Am35t)

Describes experiments in which the mechanism and course of above process was studied on a macro scale, using standard test castings. The course of solidification was followed by observing temperature changes through the casting at its vertical midpoint, using a special thermocouple set-up. Data are charted and tabulated; microstructures are illustrated.

6893 Aluminum Sand Casting Defects; Their Identification, Causes and Corrections. Donald A. LaVelle. American Foundrymen's Society, Preprint 52-12, 1952, 13 pages. (TS200 Am35t)

Illustrates a majority of common defects. Probable causes are given and suggestions for elimination discussed.

6894 Effects of Melting Furnace Atmosphere on Fluidity, Hot Tearing Tendency, and Other Properties of Malleable Iron. E. A. Lange and R. W. Heine. American Foundrymen's Society, Preprint 52-13, 1952, 12 pages. (TS200 Am35t)

The results presented pertain to metal properties produced by holding a molten iron at 2700°F. for 1 hr. under atmospheres developed by CO, CO_2, N_2, water vapor, H_2, and A. Tables and graphs.

6895 Pneumatic Reclamation for Foundry Sands. Clifford E. Wenninger. American Foundrymen's Society, Preprint 52-15, 1952, 7 pages. (TS200 Am35t)

Laboratory, pilot-plant, and commercial development of above key unit in an "air-scrubber." Characteristics and economics of a commercial installation. Diagrams, tables, and illustrations.

6896 Practical Consequences of Space, Time and Temperature Relations During Casting of Metals. J. S. Abcouwer. American Foundrymen's Society, Preprint 52-19, 1952, 5 pages. (TS200 Am35t)

Mathematical treatment, making use of a temperature discontinuity at the metal-mold interface, gives a temperature distribution in accord with recently published experimental results. Formula for the dimensioning of risers and heads.

6897 Mineral Perlite and Its Use in the Foundry. E. D. Boyle and H. R. Wolfer. American Foundrymen's Society, Preprint 52-21, 1952, 8 pages. (TS200 Am35t)

6898 Investment Casting of Aluminum. H. Rosenthal and S. Lipson. American Foundrymen's Society, Preprint 52-39, 1952, 6 pages. (TS200 Am35t)

Mechanical properties of Al test bars produced by investment casting were found to approximate those obtained by sand-casting methods. Tables, graphs, photographs, and macrographs.

3. *Foundry Practice*

6899 Sand Control With Particular Reference to the Prevention of Scabbing. W. B. Parkes. American Foundrymen's Society, Preprint 52-42, 1952, 15 pages. (TS200 Am35t)

Incidence of scabbing was studied by means of test castings, and results are correlated with certain physical properties of the sand. A variety of sand compositions was evaluated. Graphs and photographs. 13 ref.

6900 Melting Iron in a Basic-Lined Water-Cooled Cupola. Wally Levi. American Foundrymen's Society, Preprint 52-48, 1952, 14 pages. (TS200 Am35t)

Describes development of experimental procedure and equipment, including basic cupola design. Results of several heats are tabulated.

6901 Use of Aluminum Bronze In High Pressure Castings. Thornton C. Bunch and George E. Dalbey. American Foundrymen's Society, Preprint 52-54, 1952, 6 pages. (TS200 Am35t)

Possibility of substituting Al bronze castings for brass forgings and for gunmetal in certain high-pressure heavy castings. Solidification properties. Radiographs, micrographs, macrographs, and photographs.

6902 Effects of Mold Materials on Leak Tightness and Mechanical Properties of 85-5-5-5 and 81-3-7-9 Alloy Casting. J. G. Kura and L. W. Eastwood. American Foundrymen's Society, Preprint 52-55, 1952, 15 pages. (TS200 Am35t)

Extensive tabular and graphical data. Micrographs and radiographs.

6903 Flowability of Foundry Sand. Loris M. Diran, Amos J. Shaler, and Howard F. Taylor. American Foundrymen's Society, Preprint 52-60, 1952, 15 pages. (TS200 Am35t)

Analyzes concepts of "flowability" and "moldability" of sands. Results of grid analyses show that flow of molding sands under pressure is the result of 2 different mechanisms: during deformation and in later stages. Flow depends upon type of bond used, upon shape of the sand grains, and upon method of loading. Composition effects were also determined. Tables, graphs, photographs, and diagrams.

6904 Application of Chills to Increasing the Feeding Range of Risers. E. T. Myskowski, H. F. Bishop, and W. S. Pellini. American Foundrymen's Society, Preprint 52-66, 1952, 11 pages. (TS200 Am35t)

The length of steel plate and bar castings which can be made sound when directional solidification is aided by use of adequate steel chills was determined radiographically and related to thermal gradient conditions in both the casting and chill. Similar studies with high-conductivity Cu and water-cooled chills show that the added improvement in soundness obtainable by such chills is negligible. Basic effects of chill behavior as related to heat flow and solidification mode are discussed. Graphs, tables, diagrams, and radiographs.

6905 Effects of Gating Practice on Leak Tightness of 85-5-5-5 and 81-3-7-9 Alloy Castings. J. G. Kura and L. W. Eastwood. American Foundrymen's Society, Preprint 52-67, 1952, 9 pages. (TS200 Am35t)

Effects of pouring temperature and melting practice were also determined, and relative susceptibilities of the two alloys to leakage were compared. Diagrams, graphs, tables, and radiographs.

6906 Metallurgical Blast Cupola. R. Doat and M. A. DeBock. American Foundrymen's Society, Preprint 52-76, 1952, 8 pages. (TS200 Am35t)

Describes and diagrams above cupola, developed and operated at Liege, Belgium, for production of good-quality gray iron for pipe spinning, from charges consisting of 90 and even 100% mild-steel scrap. The set-up resembles a combination small blast furnace, slagging gas producer, and cupola. Detailed operating data are presented; a series of advantages are summarized. 12 ref.

6907 Patterns for High Production Malleable and Steel Foundries. Joseph M. Kreiner. American Foundrymen's Society, Preprint 52-77, 1952, 4 pages. (TS200 Am35t)

Design, construction, and standardization of pattern and core-box equipment. The type of patterns described are constructed on interchangeable basis. The castings must interchange in an assembly with castings made in 8 different foundries. Diagrams.

6908 Alloying Zirconium to Magnesium. W. P. Saunders and F. P. Strieter. American Foundrymen's Society, Preprint 52-78, 1952, 10 pages. (TS200 Am35t)

Merits of several Zr-containing materials for the above were investigated. Use of a master alloy containing about 40% Zr, balance Mg, appears to possess many advantages over both metallic Zr and Zr salts. Tables and graphs. 58 ref.

6909 Slag Control in the Cupola. E. Witten. Henry Brutcher, Translation No. 2746, 20 pages. (From *Giesserei*, v. 38, May 17, 1951, p. 221-227.

Previously abstracted from the original.

6910 Synthetic Resin Core Binders; Report and Recommendations of Sub-Committee T.S. 30 of the Technical Council. G. L. Harbach, chairman. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A100-A107; disc., p. A107-A112. (TS200 In7p)

Presents and correlates findings resulting from circulation of a questionnaire to a number of foundries.

6911 Moulding and Testing Non-Ferrous Hydraulic Castings. W. Thomson. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. B102-B109. (TS200 In7p)

The two points which form the basis of this paper are the investigation of various types of test-bars and experiments with a "hydraulic" mixture. Specimens are bronzes and Al alloys.

Books

6912 Hochwertiges Gusseisen (Grauguss) seine Eigenschaften und die physikalische Metallurgie seiner Herstellung. [High-Strength Cast Iron (Gray Iron) Its Properties and Physical Metallurgy of Its Production.] Ed. 2. Eugen Piwowarsky. 1070 pages. 1951. Springer-Verlag, Berlin, Germany. (TN710 P68h02)

A comprehensive treatise on the structure, properties, production, testing, and uses of unalloyed and alloyed cast irons. Also deals with the effects of gaseous and solid elements and of thermal and mechanical treatments on the properties of cast irons. Tables, graphs, diagrams, photographs, micrographs, and numerous references.

See also:
7141 (nodular-graphite formation in cast iron)
7234 (hot tearing of steel castings)
7235 (removal of Al from gunmetal)
7461 (forging and casting magnets)
7465 (Zn die castings)
7474 (foundry ventilation)
7638 (refractory practice in cupola—air furnace duplexing)
7940 (casting of Be-Cu molds for plastics)

4. METALS—PRIMARY WORKING

6913* Automatic Extrusion Plant for the Aston Chain and Hook Company. *Engineering*, v. 173, Mar. 21, 1952, p. 374-376; Mar. 28, 1952, p. 392-394; **An Extrusion Plant.** *Engineer*, v. 193, Mar. 28, 1952, p. 444-447.

Describes, diagrams, and illustrates 2000-ton horizontal extrusion press used by above British firm for production of extruded brass and Cu sections, particularly commutator sections, for electrical industry. They also produce a number of brass and Cu tubes and special hollow sections.

6914 Behind the Venetian Blind—Aluminum Strip Rolled From Continuously Cast Bar. J. L. Hunter and R. A. Quadt. *Iron Age*, v. 169, Apr. 10, 1952, p. 118-120.

Describes Hunter Douglas machine for continuously casting Al and its alloys into horizontal bars 55 ft. in length or longer. Produces cast bars that are subsequently hot-rolled to strip without scalping or edge trimming. Surface and edge quality is of such order that scarfing operations considered normal in the Al wrought industry are not necessary. Metallurgical soundness and uniformity are at least equivalent to commercial material.

6915 Latest Developments in Extrusion of Metals. Erwin Loewy. *Iron and Steel Engineer*, v. 29, Apr. 1952, p. 65-69; disc. p. 69-70.

Discusses above together with many of the problems faced in making progress in this field. Confined to hot extrusion. Chiefly considers high-temperature alloys.

6916 Pressure Distribution Between Stock and Rolls in Hot and Cold Flat Rolling. C. L. Smith, F. H. Scott, and W. Sylwestrowicz. *Journal of the Iron and Steel Institute*, v. 170, Apr. 1952, p. 347-359.

Describes method for above using a photoelastic dynamometer; also, devices for measuring back tension and total force separating the rolls. Results given for cold rolling of annealed Cu strip, 2 mm. thick x 40 mm. wide, for reductions from 5-50%, and for similar hot-rolled Cu strips with reductions of 18, 26, and 36%. Comparisons made with results calculated by Orowan's method. Apparatus diagrams and graphs. 13 ref.

6917 Sheath Working of Zirconium Ingots. E. T. Hayes, G. L. Frederic, and E. D. Dilling. *Metal Progress*, v. 61, May 1952, p. 83-86.

Describes and illustrates above procedure which consists of sheathing the Zr ingots in heavy-wall seamless mechanical tubing and welding end plugs to the sheath to form a complete seal. After forging and rolling, the Fe sheath is stripped and the Zr metal worked to finished size.

6918* Electric Box-Type Furnace Increases Efficiency of Heat Treating Dental Forgings. *Modern Machine Shop*, v. 24, Apr. 1952, p. 250, 252, 254.

Brief account of the above as used at the S. S. White Dental Mfg. Co., Philadelphia.

6919 Wax Filamented Model Billets Aid Study of Material Flow. J. L. Holmquist. *Product Engineering*, v. 23, Apr. 1952, p. 158-163.

Displacement and change of shape of colored wax filaments in a wax billet show how material flows in various stages of the Mannesmann process. Analysis of observations is presented in terms of the type and amount of deformation the material is subjected to in the rolling and piercing operation. Diagrams and illustrations.

6920 Experts Outline Factors in Forging. Thomas Gialdini. *SAE Journal*, v. 60, Apr. 1952, p. 69-70.

Questions and answers in panel discussion of forging held at SAE National Tractor Meeting, Milwaukee, Sept. 10, 1951.

6921 An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. N. H. Polakowski. *Sheet Metal Industries*, v. 29, Apr. 1952, p. 315-324.

(To be continued.)

6922* Friction, Wear, and Lubrication in Wire Drawing. (In German.) Werner Papsdorf. *Stahl und Eisen*, v. 72, Apr. 10, 1952, p. 393-399.

After a short historical survey of the application of lubricants to the above, the latest theories and experiments on friction and wear are correlated. Graphs, tables, and diagrams. 17 ref.

6923* Lubricants and Coatings for Drawing of Steel Wire. Part I. (In German.) Werner Lueg and Karl-Heinz Treptow. *Stahl und Eisen*, v. 72, Apr. 10, 1952, p. 339-412; disc., p. 412-416.

Reviews theory of wire-drawing lubrication. Describes materials tested, test procedures, and their interpretation, influence of different coatings and lubricants on coefficient of friction and mean pressure in drawing of steel wire. Graphs, tables, and micrographs. 26 ref.

6924* Design and Mode of Operation of a Cluster-Type Reversing Cold-Rolling Mill With a Fluid Drive. (In German.) Martin Reimann. *Stahl und Eisen*, v. 72, Apr. 10, 1952, p. 416-421; disc., p. 421-423.

High-speed reversing cold-rolling mills having very thin working rolls for production of cold-rolled steel strip of very small gage. Continuously variable mill drive by means of fluid-drive gears with 120 atm. of working pressure. Design and operation of the fluid-drive gear. Oil-hydraulic regulators for controlling the roll drive, reels, and tension strip. Operational results. Schematic diagrams.

6925 Basic Forming Techniques For the Copper Base Alloys. Part II. Lester F. Spencer. *Tool Engineer*, v. 28, May 1952, p. 62-65.

Causes of stress cracking and its prevention. (To be continued.)

See also:
7982 (extrusion of metals)

5. METALS—SECONDARY WORKING

6926* Glass Forming-Tools. J. Rees and P. K. Digby. *Aircraft Production*, v. 14, May 1952, p. 148-150.

Describes small-batch production of above for making components from light-alloy sheet. Tool types covered are heating-blocks, rubber-die press tools, and drop-hammer tools. Considers limitations and advantages. Photographs.

6927* Theoretical Analysis of the Process of Drawing Sheet Metal. (In Russian.) I. A. Noritsyn. *Izvestia Akademii Nauk SSSR*, Section of Technical Sciences, Nov. 1951, p. 1696-1703.

An analysis is made of the stress states in the various stages of drawing processes. Formulas for optimum operating parameters are proposed based on ultimate strength, resistance to deformation, radius of curvature, and thickness of metal. Schematic diagrams.

6928 Machining Data on High Temperature Alloys. P. G. DeHuff and D. C. Goldberg. *Automotive Industries*, v. 106, May 1, 1952, p. 46-49, 82, 86.

Analysis of some of the alloys used in jet engines. Parts application for these various alloys. Shear strength, coefficient of friction and machining constant—plus the hardness, strain hardenability, and the amount of abrasive particles on the metal—all affect the inherent machining qualities of the alloy. Summarizes the effect of these factors upon inherent machinability.

6929* Turbine Blades in Half the Time. Richard E. Stockwell. *Aviation Age*, v. 17, Apr. 1952, p. 40-41.

Illustrates and describes the Omes upsetting machine which pushes a bar stock back onto itself by 30-50 diameters and cuts turbine-blade production in half.

6930* Oxygen-Flux Surface Cutting of High-Chromium Steels. (In Russian.) S. G. Guzov and O. Sh. Spektor. *Avtogennoe Delo*, v. 22, Sept. 1951, p. 19-22.

The removal of surface defects from ingots and billets of the above by oxygen cutting is discussed. Influence of torch design and other factors is thoroughly analyzed. Apparatus is diagrammed; results are charted, tabulated, and illustrated.

6931* Influence of Purity of Oxygen on the Process of Oxygen Surface Cutting. (In Russian.) A. K. Ninburg. *Avtogennoe Delo*, v. 22, Oct. 1951, p. 13-16.

Above was investigated on low-carbon steel. It was found that O_2 of less than 95% purity is not satisfactory; for a given purity there is an optimum rate corresponding to the maximum productivity of the cutter and minimum use of O_2. Tables and graphs.

6932* Die Design for Metal Drawing. Charles R. Cory. *Better Enameling*, v. 23, Apr. 1952, p. 22-23, 25-28, 33.

Discusses and diagrams the forming of parts from flat sheets of metals.

6933* Diamond Grinding Wheels and Their Application. W. Peter. *Industrial Diamond Review*, v. **12**, Mar. 1952, p. 47-48.

Discusses diamond grinding wheels for machining hard materials. Characteristics are tabulated. Includes type of bond and bond material—steel alloy, special bronze, Cu, special cast iron, and synthetic resin.

6934 How to Machine Titanium. D. C. Goldberg and W. S. Hazelton. *Iron Age*, v. 169, Apr. 17, 1952, p. 107-110.

Data is from joint Navy-Westinghouse research, and covers turning, broaching, drilling, tapping, reaming, and milling. Use of carbon dioxide gas as coolant wherever possible is recommended. Based on actual production experience.

5. *Metals—Secondary Working*

6935* Russian Practice in Machining With Cemented Carbides. N. H. Polakowski. *Machinery* (London), v. 80, Mar. 27, 1952, p. 540-543.

Presents a brief outline of recent developments in carbide tool design and the performances said to be obtained in the U.S.S.R. Limited to single-point machining. Deals with cast iron, hardened, and heat-resisting austenitic steel. Tables and diagrams.

6936* Machining Magnesium. Frank Charity. *Modern Machine Shop*, v. 24, Apr. 1952, p. 114-116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144; May 1952, p. 138, 140, 142.

A summary covering unique properties of Mg together with recommended methods of machining it and its alloys. Discusses fire hazards and preventive measures. Mentions polishing methods. Tables.

6937* Methods of Research on the Machinability of Metals. (Concluded.) (In French.) Léon Czaplicki. *Revue Universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie*, ser. 9, v. 95, Mar. 1952, p. 76-89.

Discusses the above with respect to measurement of cutting forces, microhardness, cold hardenability, life of the tool, feed at constant temperature, cutting temperatures, and heat released during cutting. Includes schematic drawings, charts, and tables. 19 ref.

6938 New Horizons for Aero Machining. Malcolm F. Judkins. *SAE Journal*, v. 60, Apr. 1952, p. 49-52.

Reviews proceedings of Los Angeles firm. New techniques and equipment for different shapes and materials are discussed.

6939 Increasing Productivity in Production Machining. Michael Field and Norman Zlatin. *SAE Quarterly Transactions*, v. 6, Apr. 1952, p. 196-212.

The methods fall into two categories; reduction in time of performing the handling, clamping, rapid traversing, and other machine functions necessary to bring the workpiece to the cutting tool; and reduction in time necessary to machine the metal. This second method is described in detail. Numerous graphs and photomicrographs of cast irons.

6940 Design and Manufacturing Techniques With Titanium. O. A. Wheelon. *SAE Quarterly Transactions*, v. 6, Apr. 1952, p. 373-384.

The approach is one of determining the characteristics of the material and making designing and manufacturing practices compatible. Photographs.

6941 The Neutral Line and Its Application to Bend Allowances. A. Dickason. *Sheet Metal Industries*, v. 29, Apr. 1952, p. 327-331, 333.

Includes diagrams and formulas.

6942* Dynamics of Rapid Machining. (In Russian.) A. M. Rozenberg and Iu. P. Zimin. *Stanki i Instrument*, v. 22, Sept. 1951, p. 11-13.

Discusses influence of cutting rate on cutting force during machining of steel. Tables and graphs.

6943* The Process of Forming Elementary and Compact Steel Chips. (In Russian.) M. I. Klushin. *Stanki i Instrument*, v. 22, Sept. 1951, p. 14-15.

Discusses mechanism of the above, occurring during machining.

6944* Cutting Force During the Formation of Metallic Chips. (In Russian.) T. N. Lopadze. *Stanki i Instrument*, v. 22, Sept. 1951, p. 15-16.

Equations are developed to express the above.

6945* Dependence of Cutting Rate and Stability On Feed Rate During Rapid Milling. (In Russian.) L. A. Rozhdestvenskii. *Stanki i Instrument*, v. 22, Sept. 1951, p. 17-18.

Experiments were conducted on the above, using several steels. Data are discussed and charted. A note by the editor takes exception to some of the author's statements.

6946* Condition for Preparing Standards for Smoothness of Turning, Grinding, or Lapping. (In Russian.) Iu. D. Ligsnii. *Stanki i Instrument*, v. 22, Sept. 1951, p. 20-27.

Preparation of samples for determining the smothness produced by various machining operations on steel, cast iron, bronze, duralumin, and silumin is described. Data are tabulated and charted.

6947* The Significance of Circumferential Forces During Face Milling Using Hard-Alloy Cutters. (In Russian.) A. I. Kashirin and V. Ia. Rassokhim. *Stanki i Instrument*, v. 22, Oct. 1951, p. 6-8.

The dependence of circumferential forces on cutting speed, depth of cut, feed per tooth, and face angle was determined. Data are tabulated and charted.

6948 Grinding Carburized and Nitrided Steels With "Monocorundum" Wheels. (In Russian.) M. S. Rakhmarova. *Stanki i Instrument*, v. 22, Oct. 1951, p. 14-16.

A new abrasive material "monocorundum" was shown to be superior for grinding carburized and nitrided steel articles. Characteristics of a variety of abrasive wheels are charted and discussed.

6949* Properties of High-Speed Steel (EI347). (In Russian.) E. I. Malinkina, S. I. Volkov, Z. N. Arkhangel'skaia, and A. A. Badaeva. *Stanki i Instrument*, v. 22, Oct. 1951, p. 17-18.

Cutting tools and end mills made from 3 types of high-speed steel were compared. Advantages and disadvantages of above steel are given particular attention because of its low W and V contents. Data are tabulated and charted.

6950* Influence of Specific Gravity of Hard Alloys on the Cutting Qualities of Tools. (In Russian.) M. N. Nikolaichik. *Stanki i Instrument*, v. 22, Oct. 1951, p. 20-21.

Experiments on cemented-carbide tools. Increased specific gravity accompanied decreased wear resistance. Graphs.

6951 How to Hot-Form A Dimple. Thomas A. Dickinson. *Steel Processing*, v. 38, Apr. 1952, p. 172-174.

Describes method which avoids cracking in rivet hole forming of Al, Mg, Ti, and some alloy steels.

6952 Electronic Controls—Machine Tool Applications. Robert T. Kimmel. *Tool Engineer*, v. 28, May 1952, p. 69-76.

Describes and discusses research and development work being conducted by the machine-tool builders, the machine-tool users, and the electronics manufacturers.

Miscellaneous Publications

6953 Reasons for the Longer Life of Tools Sharpened by the Electrospark Process. V. I. Arkharov, Z. P. Kichigina, and A. A. Spiridonov. Henry Brutcher, Translation No. 2760, 7 pages. (From *Doklady Akademii Nauk SSSR*, new ser. v. 78, June 1, 1951, p. 673-676.)

Presents results of investigation of physical changes produced by electrospark sharpening of surface layer of steel tools, and of changes occurring in this layer during subsequent use of the tools. Effects of pressure and temperature on condition of the surface layer in service were determined. Character of the austenite transformation under primary influence of stress as compared with temperature was studied. Assumptions are made in regard to mechanism of extension of tool life as result of electrospark processing. The best combination of cutting speed and feed was investigated.

6954 Cutting With Ultra-High Purity Oxygen. E. H. Roper and J. F. Kiernan. American Foundrymen's Society, Preprint 52-57, 1952, 9 pages. (TS200 Am35t)

Experiments to determine effects of O_2 purities between 99.0 and 99.83% on cutting and starting of cuts on steel plate, billets, and cast-steel sections. These studies show a straight-line relation between O_2 purity and cutting efficiency for the region explored. Starting times were independent of purity. Economic analysis indicates insufficient gains for commercial adoption.

Books

6955 Metody Opredelenia Obrabatyvaemosti Metallov. (Methods of Determining the Workability of Metals.) E. I. Fel'dshtein. 143 pages. 1946. Government Scientific-Technical

Publishing House for Machine-Construction Literature, Moscow, U.S.S.R. (TS213 F33m)

Reviews classical methods for the above which entirely reproduce the corresponding type of machining, accelerated methods of investigation based on short-time tests, and the relation between mechanical properties of metals and their workability. Emphasis is on "face machining"; and experimental verification of applicability of this method is presented. 75 ref.

6956 Skorostnoe Frezerovanie Stali. (High-Speed Machining of Steel.) P. P. Grudov, S. I. Volkov, and V. M. Vorob'ev. 259 pages. 1950. Central Bureau of Technical Information, Moscow, U.S.S.R. (TS320 G92s)

The theory of cutting is thoroughly reviewed and its application to the design of lathes and milling machines is analyzed. Production of cutting tools, and operation of different types of automatic and semi-automatic mill machines, are comprehensively described. Numerous tables, diagrams, and illustrations. 41 ref.

See also:
7188 (machinability of cast iron)
7232 (machinability of Al-Zn alloys)
7233 (machinability of Al casting alloy)

6. POWDER METALLURGY

6957* Sintered Aluminium of High-Temperature Strength. (In German.) R. Irmann. *Aluminium*, v. 27, Oct. 1952, p. 29-36. See abstract from *Révue de l'Aluminium*, v. 28, July-Aug. 1951, p. 269-275; Sept. 1951, p. 311-316.

6958 Five Ways to Make Iron Powder. B. T. duPont and Robert Fulton. *Iron Age*, v. 169, Apr. 24, 1952, p. 135-139.

Describes full-scale and pilot-plant production processes at Plastic Metals Div., National Radiator Co., Johnstown, Pa. In the electrolytic process, high-purity Fe powder is obtained from steel plates. A rotary kiln, saggers, and a continuous belt furnace all turn out sponge iron of different types. Scrap is still another source of Fe powder being melted, atomized, pulverized, and decarburized. Tabular data on properties.

6959* Determination of Particle Size in the Submicron Range. Y. Schubert and B. Kopelman. *Powder Metallurgy Bulletin*, v. 6, Apr. 1952, p. 105-109.

Brief discussion, with a table on methods available for the above, classified according to size. Specifically deals with measurements of ultra-fine Fe powder and B.E.T. and X-ray line-broadening methods.

6960* High Density Iron Powder Parts. Philip R. Kalischer. *Precision Metal Molding*, v. 10, Apr. 1952, p. 32-34, 99-100.

Discusses properties, method of manufacture, applications, and design of these compacts. Photomicrographs.

6961* New-Type Powdered Metal Bearing With Built-In Oil Reservoir. *Precision Metal Molding*, v. 10, Apr. 1952, p. 35, 101.

Describes above, produced by Michigan Powdered Metal Products Co., Northville, Mich. Bearings are made with porous Fe core and high-density surface. For high-speed applications a bronze bearing face is applied.

6962* Precision in Metal Powder Parts Is Not Limited to Dimension. Erle I. Shobert, II. *Precision Metal Molding*, v. 10, Apr. 1952, p. 36-37, 114.

Discusses a broader conception of precision for powdered metal components by including generation of some of essential properties of materials in the molding operations such as those pertaining to electrical, magnetic, and mechanical properties. Thus, in addition to sizes and tolerances, densities, time under pressure, and die design must be considered.

6963* Characteristics of Core Materials Produced by Powder Metallurgy. *Precision Metal Molding*, v. 10, Apr. 1952, p. 38, 40.

Brief discussion of above for high-frequency electronic applications. Covers carbonyl Fe powders, especially, and ferrites. Tables and graphs.

6964* A Directory of the Powder Metallurgy Industry. *Precision Metal Molding*, v. 10, Apr. 1952, p. 53-55, 57-60, 62-64, 66, 68-69, 71-74, 76.

A list of components fabricators, powder producers, and equipment builders.

6964a* National Cash Register Pioneers in High Density Iron Powder Parts. Philip R. Kalischer. *Precision Metal Molding*, v. 10, May 1952, p. 38-42, 70-74, 76-77.

Discusses some of the actual parts being made from iron powder at N.C.R., and considers briefly the fabricating procedures used. Photomicrographs.

6965* Industrial Applications of Semi-conductors. 2. Silicon Carbide Resistors. R. W. Sillars. *Research*, v. 5, Apr. 1952, p. 169-175.

Discusses the above, covering manufacture and uses of resistors and general properties of Si carbide .

6966* Magnetic Observation of Diffusion During Sintering of a Nickle-Zinc Alloy. (In German.) Werner Köster and Josef Raffelsieper. *Zeitschrift für Metallkunde*, v. 43, Feb. 1952, p. 37-39.

Describes and diagrams method consisting of recording and analysis of magnetization curves. Results are indicated for some Ni-base alloys containing Zn.

Books

6967 Aluminum Powders and Pastes: "The Tale of the Powdered Pig". 84 pages. 1951. Reynolds Metals Co., Louisville, Ky. (TS555 R33a)

This illustrated manual covers development of Al powders; modern production methods; applications to paints and coatings; to pyrotechnics; to heat reactions; to chemical processing; to powder metallurgy; to surgery and silicosis; miscellaneous uses; characteristics; testing and evaluation; and rehandling and storage.

See also:
6878 (dies from W carbide-Co powder)
7005 (welds with Fe-powder backup)
7072 (finishes for powdered-metal parts)
7115 (powder metallurgy of Mo-Al alloys)
7187 (Mo ingots by powder metallurgy)
7320 (powder metallurgy for spectrochemical-standard preparation)

7. METALS—WELDING OR JOINING

6968* Construction Technique For Large Aluminum Storage Tanks. (In Italian.) *Alluminio*, v. 21, Jan. 1952, p. 65-88.

Discusses the above with respect to selection of material, calculation of thickness, construction and installation patterns, and inspection. Includes tabular data, photographs, and schematic diagrams. 42 ref.

6969* Araldit Bonding of Light Metals. (In German.) *Aluminium*, v. 28, Jan.-Feb. 1952, p. 14-19.

Form of bonding agents, chemical and physical properties, hardening data, behavior of bonds between Al-Mg-Si and other alloys. Effect of amount of overlap on strength. Practical applications. Tables, graphs, and diagrams.

6970* Welding of Light-Metal Cables by Means of an Aluminothermic Method. (In German.) R. Frey. *Aluminium*, v. 28, Jan.-Feb. 1952, p. 28-31.

Describes, diagrams, and illustrates apparatus and procedure.

6971 Peroxide Tanks Pose Welding Problems. W. F. Shefelton. *American Machinist*, v. 96, Apr. 14, 1952, p. 173.

Picture study of weld fabrication of large tank made of ⅝ in. high-purity Al, for storage of H_2O_2. Inside seams are Heliarc welded; outside seams are preheated with a gas-welding torch to 300°F. prior to welding; and head seams are sigma welded on the outside. Circumferential seams are sigma welded after inside has been Heliarc welded with high-purity rod.

7. *Metals—Welding or Joining*

6972* Electric Arc-Welding of Magnesium Alloys. (In Russian.) K. K. Khrenov, M. I. Garchenko, and G. P. Sakhatskii. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 1-5.

An investigation was made of carbon-arc welding of Mg alloys. Fluxes, weld design, and other variables were studied. Results are discussed, tabulated, and illustrated. Micro- and macrophotographs. 12 ref.

6973* Welding of Rod Frameworks for Reinforced Concrete by the Method of N. G. Slavianova. (In Russian.) S. T. Nazarov and I. S. Dmitriev. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 6-9.

Variables of the above were studied. Results are tabulated and illustrated. Schematic diagrams.

6974* Instrument for Dilatometric Control of the Spot Welding Process. (In Russian.) D. S. Balkovets and A. P. Pomortsev. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 10-13.

Apparatus for the above is described and diagrammed and its use is discussed. Typical data are tabulated.

6975* Calculation of Resistance During Spot Welding of Low-Carbon Steel. (In Russian.) L. V. Glebov. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 13-14.

Equations for the above are developed. Several variables are discussed. Data are tabulated and charted.

6976* Electrical-Contact Resistance During Fusion Butt Welding. (In Russian.) P. S. Elistratov. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 14-16.

Experimental values of the above are broken into component parts. Current density, rate of fusion, and types of welding machine (2 types) were the principal variables. Data are tabulated and charted for low-carbon steel.

6977* Mechanism of Striking Electric Welding Arcs. (In Russian.) M. Ia. Broun and G. I. Pogodin-Alekseev. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 16-17.

Presents a theoretical discussion of the above. Several variables are included.

6978* New Automatic Apparatus for Arc Welding Thin Sheets of Steel. (In Russian.) B. I. Kalinkin. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 17-20.

A new machine for the above is described and schematically illustrated. Applications are also discussed.

6979* Manufacture of UONI-13/45 and UONI-13/55 Electrodes on Heavy-Duty Electrode Presses. (In Russian.) K. V. Rozzhivin. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 21-22.

Ways of applying better quality electrode coatings for increasing production are discussed.

6980* Electrodes for Welding Cutting Tools and Machine Parts. (In Russian.) A. I. Serpokrylov, D. Ia. Sobantsev, F. I. Bukin, and N. F. Varik. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 22-23.

The preparation of high-speed-steel electrodes is briefly described.

6981* The Pre-eminence of Soviet Science and Technology in Welding Under Flux. (In Russian.) *Avtogennoe Delo,* v. 22, Sept. 1951, p. 1-3.

Describes various examples of developments in the above field said to have been made in Russia ahead of America and other capitalistic countries.

6982* Nitrogen-Arc Welding of Copper. (In Russian.) A. N. Shashkov and Ts. S. Khromova. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 4-7.

The use of nitrogen instead of argon as a protective medium for the above is discussed. Results of the two methods are compared in photographs. Data are tabulated and charted.

6983* Investigation of Parameters of the Gas Pressure Welding of Tubes. (In Russian.) A. S. Fal'kevich and R. B. Poliakova. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 7-11.

Various aspects of the process of the butt welding of low-carbon steel tubing by the gas-pressure method were studied. The use of automatic equipment is also discussed. Data are tabulated and charted.

6984* The Problem of the Transfer of Phosphorus From the Flux Into the Weld Metal During Automatic Welding. (In Russian.) M. R. Shraerman. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 11-14.

The above was investigated in the laboratory. The influence of P and Mn content on mechanical properties of welds in 1.40%-Mn steel was determined. Data are tabulated and charted.

6985* Conditions for Exceeding the Output Characteristic of a Welding Transformer Through a Given Point. (In Russian.) G. I. Leskov. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 14-15.

Presents a mathematical discussion of the above. Results are discussed and charted.

6986* Production of UONI-13, UP1, and UP2 Electrodes on Heavy-Duty Presses Using High Pressures. (In Russian.) K. V. Petran. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 16-19.

Mass production of coated electrodes for carbon-steel welding is discussed. Mechanical properties of deposited metal from various electrodes are tabulated.

6987* Welding High Pressure Tubes. (In Russian.) I. Z. Kagan. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 24-25.

Discusses the preparation and welding of thick-walled, carbon-steel tubing. Includes diagrams and illustration.

6988* Definition of the Concept of the "Weldability of Metals". (In Russian.) A. A. Alov. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 26-29.

Discusses various aspects of the above. Points are illustrated by photomicrographs of welds in steel. 10 ref.

6989* The Problem of Definition of the Nature of the Concept of "Weldability of Metals". (In Russian.) A. I. Krasovskii. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 30-31.

Presents the conclusions reached by a Committee on "The Weldability of Metals" organized by "VNITOS".

6990* Influence of Chemical Composition of Certain Binary Aluminum Alloys on Their Tendency Toward Formation of Cracks During Gas Welding. (In Russian.) S. V. Avakian and N. F. Lashko. *Avtogennoe Delo,* v. 22, Oct. 1951, p. 1-6.

A study was made of the above for Al-Sn, Al-Si, Al-Cu, Al-Mg, and Al-Zn alloys. Data are tabulated, charted, and illustrated.

6991* Comparison of the Properties of Welds in 18-8 Steel Joined by Argon Arc and Other Methods of Fusion Welding. (In Russian.) A. Ia. Brodskii. *Avtogennoe Delo,* v. 22, Oct. 1951, p. 6-10.

The microstructures and other properties of welds obtained by various methods were determined. The argon-arc gave the best welds; oxy-acetylene the poorest. Data are tabulated, charted, and illustrated.

6992* Determination of Initial Values During Calculations of Regulators for Three-Phase Arc Welding. (In Russian.) D. A. Arzmatsev. *Avtogennoe Delo,* v. 22, Oct. 1951, p. 11-13.

Mathematical analysis.

6993* Contact Butt Welding of Tubes With Resulting Upsetting. (In Russian.) G. V. Nedzvetskii. *Avtogennoe Delo,* v. 22, Oct. 1951, p. 21-22.

The quality and strength of upset butt-welded steel tubes were investigated. Results are discussed and illustrated.

6994* Weld Fabrication of Nickel Apparatus. (In Russian.) I. Z. Kagan. *Avtogennoe Delo,* v. 22, Oct. 1951, p. 24-25.

Discusses oxyacetylene and argon-arc welding of Ni sheet. Data are tabulated.

6995* Values of Permissible Stresses in Welded Joints in Metallic Construction. (In Russian.) G. A. Nikolaev. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 3-4.

Discusses specifications and design data for welds in structural steels, also for electrodes used.

6996* Development of Formulas for Welded Construction for Metals Having Various Plastic Properties. (In Russian.) G. P. Mikhailov and L. A. Kaplan. *Avtogennoe Delo*, v. 22, Nov. 1951, p. 6.

Presents derivation of the above formulas. Includes graphical interpretation.

6997* Automatic Three-Phase Arc Welding of Thick "15M" Steel. (In Russian.) K. V. Liubovskii, B. L. Lazarev, and M. M. Timofeev. *Avtogennoe Delo*, v. 22, Nov. 1951, p. 7-10.

Experiments on 3-phase arc welding and on development of special fluxes are claimed to be the basis for wide introduction of this method into industry, especially for the production of thick-walled vessels and similar construction. Macrographs, tables, and diagrams.

6998* Nature and Role of the Melting Process During Flash Welding. (In Russian.) A. S. Gel'man, K. P. Imshennik, and N. S. Kabanov. *Avtogennoe Delo*, v. 22, Nov. 1951, p. 11-15.

High-speed motion pictures and oscillographs were used to study the above, as applied to welding of steel. Results are discussed and illustrated.

6999* Certain Characteristics of Flux-Submerged Welding Arcs. (In Russian.) N. G. Ostapenko. *Avtogennoe Delo*, v. 22, Nov. 1951, p. 15-21.

An oscillographic study was made of the above. Data are tabulated and illustrated. 11 ref.

7000* Definition of the Concept of "Weldability". (In Russian.) *Avtogennoe Delo*, v. 22, Sept. 1951, p. 29-30.

Discusses above concept and defines it.

7001* Roll Welds For Joining Boiler Tubes to High-Pressure Vessels. (In German.) H. Elsässer. *Brennstoff-Wärme-Kraft*, v. 4, Mar. 1952, p. 80-83.

Details of procedure, weld design, mechanical properties of welds, and test methods. Diagrams, tables, and photographs of joints.

7002 Polyisocyanates in Bonding Rubber to Metals. T. J. Meyrick and J. T. Watts. *India-Rubber Journal*, v. 122, Mar. 29, 1952, p. 505-506.

Describes a method for the use of a polyisocyanate together with a neoprene-alloprene cement. Tabular data.

7003* Latest Developments in Weld Repairing of Steel Castings. (Concluded.) R. A. Willey. *Industry & Welding*, v. 25, May 1952, p. 37-38, 40, 72-75.

Defects were cast in the test plate and then welded with the electrode under survey. Transverse mechanical properties of the weld metal were obtained by machining 0.505-in. tensile bars from 1-in. sections cut at right angles to the direction of the weld-metal passes.

7004* Discussion on Higher Tensile Steel Chain and Chain Slings. W. Gibson Biggart. *Transactions of the Institution of Engineers & Shipbuilders in Scotland*, v. 95, pt. 4, 1951-52, p. 181-194.

Additional discussion of paper published in v. 95, pt. 3, 1951-52, p. 149-176.

7005 Get Better Welds With Iron Powder Backup. *Iron Age*, v. 169, May 8, 1952, p. 116-118.

Iron powder has been successfully used as backup material for welds on SAE 1015 and 1025 steels. Hardening, resulting from rapid heat dissipation, is counteracted, and the need for chiseling out and rewelding the root of the seam is eliminated. Powder is pressed into narrow sheetmetal channels and slightly sintered. Unsintered powder bars, in as pressed form, can be bent somewhat and are suitable for pipeline welding.

7006 Fe-Ni-Co Alloys For Glass to Metal Seals. K. H. Mairs. *Journal of Metals*, v. 4, May 1952, p. 460-464.

A review of the above covering history, composition, properties, microstructure, effects of heat treatment, and uses for Kovar and Fernico alloys. Tables, diagrams, and photomicrographs.

7007* Brazing the Modern Way. Lester F. Spencer. *Machinery* (American), v. 58, Apr. 1952, p. 167-169.

Describes recommended procedures and equipment. Compositions of commercial brazing alloys are tabulated. These alloys and fluxes for various metals are discussed.

7008 Resistance Welding. A. J. Hipperson and E. J. Keefe. *Metal Industry*, v. 80, Apr. 11, 1952, p. 283-286, Apr. 18 1952, p. 306-307.

Describes modern practice in joining Cu-base alloys; Comparative physical properties of steel and Cu alloys (factors affecting resistance welding) are tabulated. Illustrated.

7009* Automatic Welding With Contact Electrodes. W. P. van den Blink, H. Bienfait, and J. A. van Bergen. *Philips Technical Review*, v. 13, Mar. 1952, p. 247-253.

Mechanization of welding has now become possible through the development of certain types of electrodes together with an automatic welder.

7010 Design Data For Metal Wire Stitching. *Product Engineering*, v. 23, Apr. 1952, p. 156-157.

Data sheet includes tables and diagrams for various metals and nonmetals involved.

7011* Counters Tunnel Problem With Long Rails, Rubber Pads. *Railway Engineering and Maintenance*, v. 48, Apr. 1952, p. 394-395.

Tells how Central of Georgia tries out new butt-welded rails with rubber pads placed above and below the tie plates in 2 tunnels in an effort to lick the problem of corrosion and excessive mechanical wear of ties.

7012 Shielded, Submerged Arc Welds Withstand Rugged Service. F. R. Drahos. *Steel*, v. 130, Apr. 14, 1952, p. 94-96.

Describes briefly some examples of applying weldments to high-tensile, heat-resistant, and corrosion-resistant alloys, whether in a cast, forged, or wrought condition. Concerns massive components for large centrifugal pumps. Photographs.

7013 Furnace Brazing: Atmospheres Set the Pace. Samuel Damon. *Steel*, v. 130, May 5, 1952, p. 102-104, 127-128.

Discusses atmospheres and requirements for specific metals.

7014* Welded Reinforcement of Openings in Structural Steel Members. D. Vasarhelyi and R. A. Hechtman. *Welding Journal*, v. 31, Apr. 1952, p. 169s-180s; disc., p. 180s-183s.

The purpose of the tests covered by this report was to determine the unit strain energy and the true stress distribution in the plastic range of the material in a flat plate with a centrally located opening, which was square with rounded corners. Two such plates made from plain-carbon semi-killed structural steel were tested in tension, one at room temperature and the other at a temperature of −20°F., the first of which failed with a complete shear fracture and the other with a fracture almost entirely cleavage. The octahedral theory was used to determine the unit strain-energy distribution, while the true stresses were computed by a method developed in the course of the investigation. Both types of analysis utilized the experimental data of the tests as the basis of the computations. Numerous diagrams.

7015* Heat Treating Properties of Low Hydrogen Electrode Weld Metals. D. C. Smith and W. G. Rinehart. *Welding Journal*, v. 31, Apr. 1952, p. 296-305.

Discusses the above with respect to necessity for matching the mechanical properties of rolled or cast steel with the weld metal which requires an adjustment of the alloy composition of the electrode and the type of electrode coating. Graphs, tabulations, diagrams.

7016* Preheating for Welding. Arthur B. Tesmen. *Welding Journal*, v. 31, Apr. 1952, p. 306-313.

A review of information and experience on producing crack-free welded joints under a wide variety of conditions. Includes table of preheat temperatures for metals and alloys. Graphs, diagrams, and illustrations. 14 ref.

7017* Resistance Variations During Spot Welding. H. Udin. *Welding Journal*, v. 31, Apr. 1952, p. 322-323.

Paper discussed was published in Nov. 1951 issue, p. 1004-1019.

7. *Metals—Welding or Joining*

7018* Pipe Weld Normalizing and Stress Relieving. C. A. Anderson, D. H. Corey and H. J. Denman. *Welding Journal*, v. 31, Apr. 1952, p. 324-329.

Deals with an improvement in the application of the 60-cycle induction-heating method; the metallurgical effects should not be changed by the electrical circuit changes described. Design computations and some of the lessons learned in the field are also included.

7019* Should Welding Be on Its Own in Education? Discussion. Donald S. Clark. *Welding Journal*, v. 31, Apr. 1952, p. 313-314.

The paper discussed was published in July 1951 issue, p. 602-606.

7020* Recommended Practice for the Welding of Steel Castings. *Welding Journal*, v. 31, Apr. 1952, p. 315-321. (A condensation.)

Excerpt-report of an exhaustive study of the above, carried out as part of the continuing research and development program of Steel Founders' Society of America. Includes specifications; effects of welding and combatting these; operations, and post-weld heat treatment.

7021 Quality Control of Spot Welded Assemblies. A. J. Hipperson. *Welding and Metal Fabrication*, v. 20; Mar. 1952, p. 99-102; Apr. 1952, p. 143-145.

Outlines methods employed for maintaining consistent spot welds. Presents tabular data on welding carbon and stainless sheet.

7022 Industrial Brazing; Design and Strength of Brazed Joints. E. V. Beatson and H. R. Brooker. *Welding and Metal Fabrication*, v. 20, Apr. 1952, p. 146-149; May 1952, p. 182-188.

Correlates and analyzes data on the above for various brazing alloys and metals joined. Recommended joint designs. Tables, graphs, and diagrams.

7023 The Twin-Arc Process. W. D. Waller. *Welding & Metal Fabrication*, v. 20, May 1952, p. 162-168.

Describes above process and equipment. Gives advantages, characteristics, applications, and cost data. Discusses new electrodes designed for mild steel. Photographs, tables, and graphs.

7024 A.C. Argonarc Process for Welding Aluminium: an Oscillographic Analysis of Effects of Welding Transformer Open-Circuit Voltage on Arc Re-Ignition. L. H. Orton and J. C. Needham. *Welding Research*, v. 5, Dec. 1951, p. 252r-274r.

A comprehensive study of the above, undertaken primarily to demonstrate broadly the factors which determine such voltages. Investigations refer to tests on 2 work plate materials over a range of open-circuit voltage, at approximately constant current, both with and without high-frequency spark injection, on a circuit deriving power from a leaky-reactance type welding transformer, and both with and without a large series capacitor in the welding circuit. Establishes for these tests the open-circuit voltages for the avoidance of rectification. Explains wide discrepancies in previous literature. Considers fundamental question of the nature of the arc reignition. Numerous oscillograms, photographs, and diagrams.

7025 Spot Welding of Coated Mild Steel Sheet. A. J. Hipperson and P. M. Teanby. *Welding Research*, v. 5, Dec. 1951, p. 275r-278r.

Provides operational data to solve certain production difficulties on the above, for electrodeposited Cd and Zn coatings. Concerns electrode sticking and sensitivity of weld to small changes of machine settings. Tables and photographs.

Books

7026 Proceedings at a Symposium on Welding and Riveting Larger Aluminium Structures. 1952. 223 pages. Aluminium Development Association, London. (TS555 AL82.2p)

Foreword and remarks are followed by two sessions, one on welding and one on riveting—each consisting of two papers, joint discussion and authors' replies. Concludes with a summary of the discussions and a list of those present.

See also:
7183 (gas-pressure welding of steel tubing)
7222 (Al spot-welding joints)
7223 (welded ship steels)
7224 (Charpy tests on welds)
7225 (stress in welded steel beams)
7233 (brazability of Al casting alloys)
7262 (weld decay in stainless steel)
7979 (metal bonding with synthetic resins)

8. METALS—THERMAL TREATMENT

7027 More Forging With Radiant Furnaces at Oldsmobile Plant. *Automotive Industries*, v. 106, Apr. 15, 1952, p. 54-56, 82.

Describes and illustrates barrel-type furnace for handling carbon-steel billets.

7028* Study of the Carburization of SAE-3312 Steel in Molten Salts. (In Portuguese.) Alberto A. Arantes and Vicente Chiaverini. *Boletim da Associaçao Brasiliera de Metals*, v. 7, Oct. 1951, p. 447-468; disc., p. 469-470.

Presents results of experiments on the above. Discusses influence of temperature of carburization and of time of treatment on characteristics of the carburized layer. Tables and graphs.

7029* Modern Designs of Malleablizing Furnaces. (In German.) K. Borchart. *Giesserei*, v. 39, Apr. 17, 1952, p. 171-179.

Batch-type furnaces. Chamber furnaces with horizontal charging by means of charging machine. Elevator-type furnaces with elevated furnace body and movable hearth carriage. Pusher-type malleablizing furnaces. Hood-type furnace with movable annealing hood and several bases. Diagrams and illustrations.

7030* Gas—Key to Industrial Production and Metal Conservation. Charles C. Eeles. *Industrial Gas*, v. 30, Apr. 1952, p. 3-5, 25-36.

Shows haw precision gas heat treatment brings savings in steel tonnage; atmospheric furnaces add to savings; and modern forge heating minimizes waste.

7031 Water Sprays: How Effective Can They Be. W. P. Wallace and T. L. Newton. *Iron Age*, v. 169, Apr. 10, 1952, p. 121-123.

Discusses results of a study of effects of pressure, nozzle size, quantity of flow, and droplet size on the cooling rates of water sprays. Specimens of 70-30 brass, heated to 1000°F in an electric furnace, were quenched. Pressures in the circulating closed system varied from 0 to 100 psig. at an output of 90 gpm. Cooling curves were automatically recorded.

7032 Continuous Carbon Restoration Furnace Boosts Production. J. D. Armour. *Iron Age*, v. 169, Apr. 17, 1952, p. 111-115.

Describes new 6-zone, continuous carbon restoring-annealing furnace at Union Drawn Wire Div. which has increased production over batch methods 112-240% per invested dollar. Greater uniformity of surface carbon and shorter cycles have also been obtained and "scalloped" bars have been eliminated. The furnace handles bars up to 6 in. diam. and coils up to 54-in. diam. Atmosphere is controllable.

7033 Unique Line Hardens and Chills 16-Ft. Pieces. H. W. Dammel. *Iron Age*, v. 169, Apr. 17, 1952, p. 120-121.

Describes a new flame-hardening machine and a special chilling unit which treats machine-tool wear strips. This heat-treating line has recently been completed at the Cincinnati Steel Treating Co. Illustrated.

7034 Rotary Furnaces Feed Automatic Steel Treating Line. A. Q. Smith. *Iron Age*, v. 169, May 8, 1952, p. 122-124.

Describes 2 jet combustion, gas-fired forging furnaces and a modern conveyer system installed in the East Chicago, Ind., plant of General American Transportation Corp. Used for heating and handling of billets for 90, 105, and 120 mm. projectiles. These billets are hot-extruded and draw-formed.

7035 Application of the Isothermal Transformation Diagram to the Normalizing of En 40C Steel J. A. Cameron.

Journal of the Iron and Steel Institute, v. 170, Apr. 1952, p. 313-320.

In reference to large forgings, evaluates Scheil's hypothesis in the pearlite range and Pumphrey and Jones' method for the bainite transformation. Tables and micrographs. 11 ref.

7036* New Automatic Shaker Hearth Furnace for Fast Production of Small Parts—Cases From .001 to .003 Obtainable in From 1 to 5 Minutes. William F. Schleicher. *Machine and Tool Blue Book*, v. 48, Apr. 1952, p. 201-204, 206.

Describes and illustrates equipment for hardening small steel tabs used in business machines with low distortion tolerances.

7037 How to Harden Small Steel Parts. Kenneth Rose. *Materials & Methods*, v. 35, Apr. 1952, p. 112-115.

Presents useful tips on ways to avoid precooling, preventing decarburization, and methods of conveying the work through the furnace.

7038 Temperature Controlled Flame Hardening. *Metallurgia*, v. 45, Mar. 1952, p. 135-137.

Describes the Peddinghaus oxy-town-gas system for surface hardening of steel.

7039* Determination of the Cooling Capacity of Quenching Baths. (In Italian.) Manlio Pesante. *Metallurgia Italiana*, v. 44, Apr. 1952, p. 145-152.

New electronic apparatus for the above. By its use, curves of cooling rate vs. temperature may be plotted. Results of preliminary tests with different types of baths and media.

7040 Some Notes on the Surface Hardening of Steels and the Use of Copper Plating for Stopping-Off. G. K. Burton. *Sheet Metal Industries*, v. 29, Apr. 1952, p. 367-368, 370.

7041* Bright Annealing of Steel Strip in Grunewald Type Furnace With Protective Gas, and Without Water Cooling. (In German.) Hans Pannek. *Stahl und Eisen*, v. 72, Apr. 10, 1952, p. 423-425.

When using annealing ovens of above type, water cooling of the rubber seal has been necessary. This has certain drawbacks. Describes tests with seals more heat resistant than rubber, and with protective gas practically free of oxygen. A composite asbestos-rubber seal gave good results. Diagrams and tables.

7042 Annealing Accelerated With Radiant Heat. Charles A. Turner Jr. *Steel*, v. 130, Apr. 14, 1952, p. 106, 108, 111.

Describes a continuous annealing method whereby tin-plate strip can be run at the rate of 1000 fpm. in direct-fired radiant-gas-heating equipment. Annealing can be a 90 sec. process.

7043 Selection and Treatment of Die Steels. Part II. Stewart G. Fletcher. *Tool Engineer*, v. 28, May 1952, p. 52-54, 57.

Influence of heat treatment on die life; surface control in heat-treatment; die design; and die-steel quality.

7044 Production Non-Ferrous Wire Annealing at Bridgeport Brass. W. J. Krailing. *Wire and Wire Products*, v. 27, Apr. 1952, p. 370-371, 421.

Presents a new idea in materials-handling methods as applied to heat-treating processes and shows how a leading manufacturer made more efficient use of existing facilities.

7045* Strength Properties of Flame-Hardened Link Pins. (In German.) H. W. Gronegre. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Mar. 11, 1952, p. 231-233.

Above process, as applied to steel "pins" or bolts, was investigated. Graphs and tables show effects of variations in procedure on hardness, bend strength, impact strength, and durability.

Miscellaneous Publications

7046 Malleable Iron Annealing Time Reduced. W. G. Wilson and N. F. Tisdale, Jr. American Foundrymen's Society, Preprint 52-41, 1952, 6 pages. (TS200 Am35t)

Addition of approximately 0.0015% B made it possible to reduce the annealing cycle markedly. Micrographs.

7047 Heat Treatment of Magnesium Alloy Castings. E. M. Gingerich. American Foundrymen's Society, Preprint 52-51, 1952, 8 pages. (TS200 Am35t)

Reviews important phases of commercial heat treatment of Mg-alloy castings. Micrographs, macrographs, and tables. 10 ref.

7048 Influence of Additions of Aluminum and Boron Upon Hardenability of Steel. B. E. Somin. Henry Brutcher, Translation No. 2762, 11 pages. (From *Stal*, v. 7, no. 7, 1947, p. 630-635.)

Effects of 0.1-0.5% Al were determined as a function of steel composition. Data on multiplying factors and critical diameters obtained upon addition of 0.1-0.2% Al to plain-carbon, Cr-Si, Cr, Mn, and Ni structural steels are given. Relation between author's data and those of American investigators is discussed. Data on effect of boron on hardenability of steel as a function of form in which it is added are also given. 19 ref.

See also:
6918 (heat treating dental forgings)
7006 (heat treatment of alloys for glass-metal seals)
7015 (properties of weld metals)
7168 (annealing vs. electrical resistance of Bi)
7188 (hardening of cast iron)
7206 (heat teratment of N-155 alloy)
7233 (aging of Al casting alloys)

9. CLEANING, FINISHING, AND COATINGS—METALLIC

7049* Light-Metal Cylinders With Hard-Chromium Contacting Surfaces. (In German.) E. Meyer-Rässler. *Aluminium*, v. 28, Jan.-Feb. 1952, p. 33-36.

Describes pretreatment which improves the properties of above surfaces, used in internal-combustion engines. Micrographs show surface appearance and internal structures of the deposits.

7050* Measurements on Thin Iron Films. A. Van Itterbeek, L. De Greve, and F. Heremans. *Applied Scientific Research*, sec. B, v. 2, no. 4, 1952, p. 320-324.

Curves are established for the specific resistance as a function of thickness for Fe films obtained respectively by sputtering or condensation in vacuum. The curves obtained with these 2 techniques are completely different. Electron-microscope and also electron-diffraction pictures of the films are given.

7051* Measurements on the Formation of Thin Tin Films. A. Van Itterbeek, L. De Greve, and F. Heremans. *Applied Scientific Research*, sec. B, v. 2, no. 5, 1952, p. 352-360.

The films are sputtered in He or Ne gas. Specific resistance and also the temperature coefficient were measured as a function of thickness. The oxidation phenomenon was studied by means of change in resistance as a function of time. Finally the structure of the films was analyzed by means of the electron microscope.

7052* A Method for the Investigation of Electropolishing Problems. K. F. Lorking. *Australasian Engineer*, Feb. 7, 1952, p. 58-61. (From symposium on "The Surface Treatment of Metals".)

Describes method based on technique developed by Hull and his co-workers for the investigation of optimum electroplating conditions. These workers designed a cell in which both electrodes are plates of metal placed vertically but not parallel to each other, so that the current density varies along the length of the cathode. In this manner, the range of finishes produced over a wide range of current density may be investigated on the one electrode.

7053* Bright Dipping. R. G. Stewart. *Australasian Engineer*, Feb. 7, 1952, p. 61-63. (From Symposium on "The Surface Treatment of Metals.")

Describes the above process which has been applied primarily to Cu and Cu-base alloys and also used extensively for Cd and Zn plating. It produces a brightening of the surface and also provides some passivation of the treated surface. The composition of the dip is determined by the composition of the material and the result desired.

9. *Cleaning, Finishing, and Coatings—Metallic*

7054* Critical Potential of Deposition of Protactinium on Various Metals. (In French.) Jacques Danon and Christiane Ferradini. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 24, 1952, p. 1361-1363.

The possibility of determining the critical potential for deposition of Pa in Hf solution, using the β-ray emitter, Pa^{233}, and measuring the quantities of Pa deposited at the cathode at various potentials maintained constant during a given time. Graph.

7055* Chromium Plating With the Bornhauser Chrome Solution. Frank Taylor. *Electroplating and Metal Finishing*, v. 5, Apr. 1952, p. 109-113.

Presents a practical exposition of the operation and applications of the process together with details of the composition and maintenance of the solution.

7056* Modified Bronze Plating as a Substitute for Nickel. G. Schmerling. *Electroplating and Metal Finishing*, v. 5, Apr. 1952, p. 115-118.

Gives the requirements necessary for an alternative for Ni, and discusses reasearch with various alloys which have been tried as substitutes. Describes in detail the modified bronze or Nickelex process which is considered a genuine substitute.

7057* Some Experience With a Proprietary Red Bronze Plating Solution as a Substitute for Nickel. F. S. Duc. *Electroplating and Metal Finishing*, v. 5, Apr. 1952, p. 123.

Discusses the process and gives some information on corrosion resistance.

7058 Oxide Films on Electrolytically Polished Copper Surfaces. J. A. Allen. *Transactions of the Faraday Society*, v. 48, Mar. 1952, p. 273-279.

Surfaces of polycrystalline Cu sheet polished electrolytically in H_3PO_4 were examined by an electrometric technique which is described, and by electron diffraction. It is shown that the surfaces are initially free from oxide films when removed from the polishing bath. The subsequent growth of oxide films in air at room temperature depends on the washing procedure adopted.

7059 Vapor Deposition May Solve Today's Coating Problems. I. E. Campbell and C. F. Powell. *Iron Age*, v. 169, Apr. 10, 1952, p. 113-117.

Discusses the above with respect to applying refractory coatings. Process can be continuous and is generally carried out at atmospheric pressure. Induction or resistance heating gives highest efficiencies, and temperature of surface being coated is most critical factor. Wire, rod, tubing, strip, and shapes have been successfully coated. Tabular data give types of coatings that can be vapor deposited.

7060* A New Anodic Method for the Transfer of Oxide Films From Heat-Tinted Iron to Glass or Plastic. U. R. Evans and R. Tomlinson. *Journal of Applied Chemistry*, v. 2, Mar. 1952, p. 105-109.

The specimen carrying the oxide film to be transferred is cemented to glass, and the metal is dissolved away by anodic action, leaving the film attached to the glass. The method has the advantage that large areas of films are transferred to a rigid, transparent support, without any doubt as to which of the two surfaces represents the outer surface of the film as present on the metal. The area of the pieces transferred can be measured, and the metal (or metals) in the films estimated by microanalysis; alternatively, by transferring to glass coated with petroleum jelly, the wrinkling or curling of the film gives information about stresses present in the films when they are attached to the metal. 11 ref.

7061* An Experimental Study of Electropolishing. (In French.) I. Epelboin. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, Feb. 1952, p. C214-C218; disc., p. C218.

Discusses present theories on the degree of hydration of ions in solution. The similarity of the results obtained with baths with bases as different as ClO_4 or PO_4 indicates that the mechanism of electropolishing is the same in all cases. Results for a series of metals and simple binary alloys are tabulated and charted. 10 ref.

7062 Ceramic Coatings. John V. Long. *Macihne Design*, v. 24, May 1952, p. 122-126.

Discusses research and results on development of coatings for heat-resistant alloys for jet engines. Describes Solaramic process which provides engine designers with a new and unique series of ceramic coatings capable of enhancing metal life by reducing oxidation and intergranular corrosion and by stabilizing metal surfaces so they can operate for greatly extended periods at high temperatures. Shows service results of ceramic-coated SAE-1010 and 4130, and 321 stainless.

7063* Unusual Chromium-Plating Problems. Alan W. Brown. *Machinery* (American), v. 58, Apr. 1952, p. 162-166.

Describes work on a variety of above problems worked on by Cro-Plate Co., Hartford, Conn., in its engineering service division. Includes preliminary abrasive-blasting operation. Steels and Al alloys are the principal base metals mentioned.

7064* Silver Plating. J. B. Mohler. *Metal Finishing*, v. 50, Apr. 1952, p. 72-75.

Describes above with the cyanide Ag bath. Gives and evaluates 3 formulas. Discusses operating conditions and effects of increasing chemicals, temperature, and agitation. Tables.

7065* Electroplating With Aluminum. Nelson F. Murphy. *Metal Finishing*, v. 50, Apr. 1952, p. 76-79.

Reviews some of processes developed for above, points out shortcomings, and indicates needs for future research. 32 ref.

7066* The Electromotive Series for Metals and Alloys. *Metal Finishing*, v. 50, Apr. 1952, p. 89.

A list of the above with brief notes.

7067* Polishing of High-Purity Aluminum by Repeated Anodizing, and Removal of the Anodic Layer. (In German.) Richard Lattey. *Metalloberfläche*, v. 6, Sec. A, Mar. 1952, p. A41-A48.

Describes and diagrams apparatus and procedure. Influence of current density, as well as effect of repeated removal of the anodic layer upon reflection values.

7068* Modern Theories of Adhesion and Its Measurement. L. Reed Brantley and Gordon Carpenter. *Official Digest*, Jan. 1952, p. 57-64.

Factors influencing adhesion of organic coatings to metals are broadly grouped into 2 classifications, physical and chemical, and are discussed. 26 ref.

7069 Photoconductivity in Vacuum Coated Selenium Films. Paul H. Keck. *Journal of the Optical Society of America*, v. 42, Apr. 1952, p. 221-225.

Discusses and presents results of an investigation of the above. Graphs and tables.

7070 Calibration of Plating Range Cells. J. B. Mohler. *Plating*, v. 39, May 1952, p. 475-476, 481.

Presents results of research on the above, used as laboratory tools for electroplating control and experimentation. The slot cell and its calibration are emphasized. Current-density-distribution equations are derived.

7071 Chromium Plating Speed Tables. Eugene L. Combs. *Plating*, v. 39, May 1952, p. 482-485.

Shows the relationship between temperature, current density, and current efficiency for the two standard Cr-plating solutions. The current density is expressed both in amp. per sq. ft. and in amp. per sq. in.

7072* Finishes Suitable For Powdered Metal Parts. *Precision Metal Molding*, v. 10, Apr. 1952, p. 83-87.

Because of their fundamentally porous nature some difficulty has been encountered in application of standard finishing techniques to parts produced from metal powders. However, there are a number of finishes which are pleasing and corrosion-resistant. Discusses briefly electroplated and black-oxide finishes and modifications of phosphate-coating processes.

7073* Preparation and Maintenance of Copper and Zinc Plating Baths Using Substitute Methods. Myron B. Diggin.

Products Finishing, v. 16, Apr. 1952, p. 40, 42, 44, 46, 48, 50, 52, 54.
Presents and discusses various substitute bath compositions, often necessary because of shortages of certain chemicals.

7074* Metallizing for Corrosion Prevention. Gilbert C. Close. *Products Finishing*, v. 16, Apr. 1952, p. 58-65.
Surveys above process and its applications. Recommended coatings for salt, industrial, and rural atmospheres, and for immersion in fresh and sea water, are tabulated.

7075 The Mechanical Surface Finishing of Metals. G. T. Colegate. *Sheet Metal Industries*, v. 29, Mar. 1952, p. 257-268.
Describes and illustrates polishing, polishing operations, and the various types of wheels and equipment used. (To be continued.)

7076 The Theory and Practice of Vitreous Enamelling. (Concluded.) J. H. Gray. *Sheet Metal Industries*, v. 29, Apr. 1952, p. 361-366.
Presents information on basic principles and requirements of the vitreous enameling process for castings. Gives frit formulas and production pointers.

7077 Rhodium Plating. F. Spicer. *Sheet Metal Industries*, v. 29, May 1952, p. 462-464.
Gives details of operating conditions and properties of coating together with photographs of typical rhodium-plated products.

7078* Apparatus for Vacuum Evaporation at High Pumping Speeds. (In French.) René Bernard and François Davoine. *Vide*, v. 7, Jan. 1952, p. 1136-1138.
Describes a high-speed (230 per sec.) and low-pressure pumping installation, making it possible to readily obtain thin metallic films. Includes photographs and diagrams.

7079* The Metallizing Process. F. Keller. *Welding Journal*, v. 31, Apr. 1952, p. 291-295.
Presents a brief historical review of the metallizing process, its field of application, apparatus needed, methods used in preparation of surfaces, the nature of the coatings and some applications. Illustrated.

7080 Coating Metal Used in Hot-Dip Galvanizing. Part I. Wallace G. Imhoff. *Wire and Wire Products*, v. 27, Apr. 1952, p. 356-360, 420-421.
A detailed discussion of the Zn-plating bath. Gives qualities and characteristics of Zn. (To be continued.)

7081* Methods of Measuring Polarization Potentials by Means of Model Experiments. (In German.) R. Piontelli, G. Bianchi, and R. Aletti. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie*, v. 56, Feb. 1952, p. 86-93.
Study of above shows the important effect of environmental conditions on results. These point to certain conclusions, which are enumerated and discussed. Results for typical metallic ions are shown graphically and diagrammatically. 10 ref.

7082* The Structure of Electrolytic Alloy Deposits. VII. Copper-Bismuth and Copper-Antimony Alloys. (In German.) Ernst Raub. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 5, Apr. 1952, p. 153-160.
Discusses deposition conditions; composition; hardness, microscopic, and X-ray analyses; structures of the deposits; and their relationships to constitution diagrams. Tables and graphs. 12 ref.

7083* Electrolytic Brass Plating in Oxalic Acid Baths. (In Russian.) A. I. Stabrovskii. *Zhurnal Prikladnoi Khimii*, v. 24, May 1951, p. 471-476.
The above was investigated as a replacement for cyanide solutions. Satisfactory results were obtained when a gelatin was added to the bath. Data are tabulated and charted.

7084* Porosity of Electrodeposited Nickel. (In Russian.) A. A. Sutiagina and A. P. Vagramian. *Zhurnal Prikladnoi Khimii*, v. 24, Sept. 1951, p. 945-950.
The influence of thickness of deposit, current density, and various surface-active materials on the above was investigated. Some materials were found to increase and others to decrease the number of pores. Up to a limiting value, porosity decreases with increasing thickness. The porosity-current density curve passes through a minimum. Data are charted. 11 ref.

7085* The Problem of Electrodeposition of Cobalt. (In Russian.) P. N. Kovalenko. *Zhurnal Prikladnoi Khimii*, v. 24, Sept. 1951, p. 951-957.
The quantitative electrodeposition of Co was investigated. Temperature, pH, and ammonium oxalate concentration were found to be the controlling variables. Tables and graphs.

7086* Criteria for Uniformity of Distribution of Metal on the Cathode and Methods for Its Determination. (In Russian.) L. I. Kadaner. *Zhurnal Prikladnoi Khimii*, v. 24, Oct. 1951, p. 1033-1044.
Presents a detailed discussion of the above. Use of experimental data to calculate satisfactory criteria is explained.

Miscellaneous Publications

7087 The Role of Chromium Chloride and Hydrogen in the Process of Hot Chromizing. N. G. Kliuchnikov. Battelle Translation. (From *Doklady Akademii Nauk SSSR*, new ser., v. 74, Sept. 11, 1950, p. 267-269.)
Previously abstracted from original.

7088 Problem of Structure of Vapor-Deposited Iron Coatings. C. Heck. Henry Brutcher, Translation No. 2771, 10 pages. (From *Zeitschrift für Metallkunde*, v. 42, Jan. 1951, p. 10-13.)
Previously abstracted from the original.

7089 The Properties of Metallic Coatings Produced by Evaporation and Sputtering. S. Tolansky. Electrodepositors' Technical Society, Advance Copy 3, 1952, 11 pages (TS670 E125j)
Outlines above methods, and indicates characteristics of the deposits in so far as they have a bearing on problems associated with electrodeposition.

7090 Practical Considerations in the Application of Vacuum Coating for Metal Finishing. L. Holland. Electrodepositors' Technical Society, Advance Copy 4, 1952, 12 pages. (TS670 E125j)
Discusses the above under the headings: design of tungsten filaments, rate of evaporation, effect of vapor incidence on Al-film structure, design of workholders, glow-discharge bombardment, effect of contaminating vapors, reflectivity of evaporated Al films, and conclusions.

7091 Lacquering to Obtain Brilliance and Metallic Lustre. H. H. Vevers and G. E. Gardam. Electrodepositors' Technical Society, Advance Copy 5, 1952, 8 pages. (TS670 E125j)
Types of lacquer used for the base and top coats in above process are discussed, together with methods of application and firing. The principle of the process is demonstrated by two simple experiments. In the usual type of application, a vacuum-deposited metallic coating is deposited in a very thin film onto a surface which has been lacquered. A further lacquer coating is then applied to protect the metallic film.

7092 The Electrodeposition of Tin-Antimony Alloys From Chloride-Fluoride Electrolytes. J. W. Cuthertson and N. Parkinson. Electrodepositors' Technical Society, Advance Copy 6, 1952, 7 pages.
Preliminary investigations shows that alloys of Sn and Sb containing up to about 45% Sb can be satisfactorily deposited from solutions containing the chlorides of the two metals, a fluoride, and an addition agent. Results so far obtained are encouraging, and the fact that bright plate can be deposited is noteworthy.

7093 The Plating of Aluminium Articles as a Production Process. A. W. Wallbank. Electrodepositors' Technical Society, Advance Copy 7, 1952, 9 pages. (TS670 E125j)
Thoroughly discusses various processes for the above, with emphasis on one which has been in use for many years by practical platers and which has yet to be equalled in its own particular field by a process of laboratory origin. Gives details of cleaning, etching, and plating solutions for deposition of Ni, Zn, and brass on Al.

9. *Cleaning, Finishing, and Coatings—Metallic*

7094 The Crystal Structure of Electrodeposited Silver. D. N. Layton. Electrodepositors' Technical Society, Advance Copy 9, 1952, 6 pages. (TS670 E125j)

Reviews the literature and presents results of experiments on the above. Includes diagrams, diffraction patterns, and micrographs. 17 ref.

Books

7095 Protection and Electro-Deposition of Metals. 350 pages. 1951. His Majesty's Stationery Office, London. (Selected Government Research Reports. v. 3.) (TS670 G79p)

A collection of reports on the above, selected from research work carried out under the direction of the Ministries of Supply and Aircraft Production, now combined as the Ministry of Supply. Following are typical examples of subject matter: chromate baths for various alloys, electrolytic polishing, removal of corrosive perspiration deposits from steel, permeability of organic coatings, influence of surface contamination on corrosion, tropical corrosion tests, analysis of plating solutions, plating thickness tests, chemical reactions in photometric analysis, and studies on the silico-molybdate reaction.

See also:

6882 (surface treatments for Al castings)
7012 (weld coating alloy steel)
7025 (welding coated steel sheet)
7040 (Cu plating of steel)
7115 (Al-Mo coatings for oxidation prevention)
7211 (effect of films on twinning of metal crystals)
7216 (embrittlement of steels from Sn plating)
7274 (evaluation of pipeline coatings)
7330 (analysis of Cr-plating baths)
7378 (Cu plating)
7463 (tin conservation in container coatings)
7483 (chromate plating-waste treatment)
7580 (Co porcelain enamel applied to Fe blanks)
7777 (electrode potential studies using radiotracers)
7818 (current distribution in electrolytic cells)
8302 (Fe plating electrotypes and stereotypes)

10. METALLOGRAPHY AND PRIMARY STRUCTURES

7096* Structure of Liquid Tin, Bismuth and Lead. (In Russian.) A. I. Danilova, V. I. Danilov, and E. Z. Spektor. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 1, 1952, p. 561-564.

X-ray studies were made of the above liquid metals. The arrangements of the atoms in the liquid and solid states are compared and discussed. Data are charted.

7097 The System Aluminum-Indium-Tin. A. N. Campbell, L. B. Buchanan, J. M. Kuzmak, and R. H. Tuxworth. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 1962-1966.

Presents a study of the above including the complete equilibrium diagram of the binary system Al-In. For the ternary system Al-In-Sn, isotherms were established for 750, 700, 650, and 450°C., using a constant-temperature furnace and sampling and analyzing congruent solutions. Tables and diagrams.

7098* Microanalytical Problems in Metallography and Metallurgy. (In German.) W. Koch. *Angewandte Chemie*, v. 64, Apr. 7, 1952, p. 187-195.

Discusses particular problems with reference to investigation of the structure of iron and steel. It has been possible to obtain new information concerning carbide and oxide inclusions, as well as those of nitrides, sulfides, and intermetallic compounds. Particular attention is paid to problems of sampling. Micrographs, photographs, diffraction patterns, graphs, and diagrams. 16 ref.

7099* Applied Research Evolves New Data on the Magnesium-Zirconium System. O. A. Carson and D. T. Austin. *Canadian Mining Journal*, v. 73, Apr. 1952, p. 70-75.

Presents results of a thesis submitted in Aug. 1949 to the Department of Metallurgy at Queen's University, Kingston, Ontario. Detailed discussion. Includes graphs and photomicrographs. 15 ref.

7100* The Use of Isoactivity Lines in Ternary Phase Diagrams. (In Swedish.) Mats Hillert. *Jernkontorets Annaler*, v. 136, no. 2, 1952, p. 25-37.

Shows that, in isothermal sections of ternary phase diagrams, compositions of constant activity for each component may be represented by contour curves, called isoactivity lines. A useful general property of such lines is formulated and the value of this property demonstrated in 5 applications. Illustrated.

7101 Structure of Oxide Replicas for Electron Microscopy. Shigeto Yamaguchi. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 445-447.

A study of the above. Concludes that oxide films formed on metals, whose atom distances coincide with those of the substrate, can reproduce the substrate faces satisfactorily. Micrographs of oxide films on a single crystal of Fe and of an Fe-Ni alloy.

7102 The Separation of Cold-Work Distortion and Particle Size Broadening in X-Ray Patterns. B. E. Warren and B. L. Averbach. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 497.

Describes method based on crystallographic measurements. Graphs.

7103 The Constitution of the Aluminium-Chromium-Zinc Alloys at Low Chromium Contents. A. R. Harding and G. V. Raynor. *Journal of the Institute of Metals*, v. 80, Apr. 1952, p. 435-448.

The system Al-Cr-Zn was examined, by metallographic and X-ray methods, at low Cr contents. Experimental procedure and results of the investigation are discussed. Phase diagrams and charted data. 15 ref.

7104 The Aluminium-Rich Alloys of the System Aluminium-Chromium-Iron. J. N. Pratt and G. V. Raynor. *Journal of the Institute of Metals*, v. 80, Apr. 1952, p. 449-458.

The system Al-Cr-Fe was examined, in the Al-rich region, by metallographic and X-ray methods and by the chemical analysis of primary crystals extracted from slowly cooled alloys. Examination of the results shows that a strong analogy exists between the Al-rich alloys of this system and those of the system Al-Cr-Mn. The close analogies between the 2 structures are discussed in terms of the nature of the binary compounds. Phase diagrams and charted data. 15 ref.

7105 Chromium Carbide in Stainless Steel. A. B. Kinzel. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 469-488.

An extensive study of $Cr_{23}C_6$ formation in AISI Type 304 stainless steel. Specimens were treated for 100 hrs. at 100° intervals from 1000 to 1500°F. and for 10 selected intervals from 5 min. to 64 hrs. at 1300°F. Metallographic observations were made on form and distribution of the carbides. Numerous photomicrographs.

7106* Investigation of Iron Amalgam for Grain Size and Ferromagnetism. (In German.) A. Mayer and E. Vogt. *Kolloid Zeitschrift*, v. 125, Mar. 1952, p. 174-175.

Brief discussion on colloidal solutions of Fe in Hg (amalgam.)

7107 The Influence of Structure on Hardness With Special Reference to Steels. H. A. Unckel. *Metallurgia*, v. 45, Mar. 1952, p. 115-120.

Discusses above and gives details of experimental results especially on a hyper-eutectoid plain-carbon steel and a high-Cr die steel. Tabular data and photomicrographs.

7108 Quantitative Printing Methods for the Study of Segregation in Steel. Hugh O'Neill. *Metallurgia*, v. 45, Apr. 1952, p. 215-216.

A trial is described to determine quantitatively the degree of sulfide segregation in a steel, by the photometry of transparent sulfur prints. The principle can be extended to phosphorus prints on cellophane. Mn and Cr printing should also be possible. Tables and graphs.

7109 Sigma Phase in High-Purity 18-10. Samuel J. Rosenberg and Caroyln R. Irish. *Metal Progress*, v. 61, May 1952, p. 92-93.

A study of phase boundaries of the Fe-Cr-Ni ternary diagram

at 1200°F., in reference to conflicting published data. Phase diagrams and micrographs.

7110* Proposed Phase Designations for Titanium-Rich Alloys. Walter L. Finlay. *Modern Metals*, v. 8, Apr. 1952, p. 69-70, 72.

Proposes system for above which would be consistent among all Ti-rich alloys.

7111* Further Observations of Growth Patterns on Silicon Carbide (SiC) Crystals. Ajit Ram Verma. *Philosophical Magazine*, ser. 7, v. 43, Apr. 1952, p. 441-446.

Reports further observations of growth patterns on SiC crystal faces using techniques previously described. Conditions for the interaction of growth fronts issuing from a number of dislocations are discussed and shapes of the loci of points of their intersection are calculated and illustrated.

7112* The Effects of Configuration Interaction on the Atomic Hyperfine Structure of Gallium. G. F. Koster. *Physical Review*, ser. 2, v. 86, Apr. 15, 1952, p. 148-154.

Theoretical and mathematical study of above. Considers also the determination of quadrupole moments of Ga, and gives estimate of those for Al, In, and Cl. Tables. 17 ref.

7113 The Crystal Parameters of Beryllium. E. A. Owen. *Proceedings of the Physical Society*, v. 65, sec. A., Apr. 1, 1952, p. 294-295.

Correlates and discusses various values reported in the literature.

7114 Austenite in Low Carbon Iron. J. W. Menter, J. Nutting, and A. L. Tsou. *Proceedings of the Physical Society*, v. 65, sec. B., Apr. 1, 1952, p. 305-306.

Grain boundaries in the above were examined by electron diffraction. Results are illustrated and briefly discussed.

7115* Some Preliminary Comments on the System Molybdenum-Aluminum. R. L. Wachtell. *Powder Metallurgy Bulletin*, v. 6, Apr. 1952, p. 99-104.

A study of the above presenting a tentative phase diagram and photomicrographs. Powder metallurgy was found satisfactory for the preparation of alloys containing less than about 70% Al. In view of the oxidation protection of Al-Mo alloy coatings, curves are included showing the performance in air of hot-pressed bodies of several compositions at 1150°C.

7116* Micrographic Study of the Brittle and Tough States of Low-Alloy Carbon Steels. (In French.) P. A. Jacquet. *Revue de Métallurgie*, v. 49, Mar. 1952, p. 195-207.

Discusses the above which is facilitated by using a coating of cellulose acetate to clean the surface which has been prepared by electropolishing followed by attack in an ether solution of picric acid; this improvement of the technique makes it possible to determine the structural differences between two states of the same piece of steel, obtained directly after tempering or by reversible heat treatment. Includes micrographs. 15 ref.

7117* "Paraglyph" Printing for the Reproduction of Radiographs. (In French.) H. Granjon. *Soudure et Techniques Connexes*, v. 6, Jan.-Feb. 1952, p. 42-43.

Describes above method in which, beginning with the original negative, a positive is made on film by contact. The proofs are then placed in contact with paper, superimposing on the printing-box the negative and the positive in slight misalignment. As a result, a relief effect is produced, equivalent to a photograph on which a radiograph is superimposed. Illustrated.

7118* New Experimental Data on Dislocations in Metals. (In Russian.) *Uspekhi Fizicheskikh Nauk*, v. 45, Sept. 1951, p. 154-158.

A review of the above taken from current literature, both Russian and Western.

7119* Determination of the Orientation of Metallic Monocrystals. (In Russian.) N. B. Gornyi. *Zapiski Vsesoiuznogo Mineralogicheskogo Obshchestva*, ser. 2, v. 80, Oct.-Dec. 1951, p. 245-257.

Describes a method for the above using reflected light rays. Results are compared with Laue-grams. Data are tabulated. Illustrated.

7120* The Miscibility Gap in the Liquid Phase of the Lead-Zinc-Silver System. (In German.) W. Seith and H. Johnen. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie*, v. 56, Feb. 1952, p. 140-143.

Thermal analysis was applied to investigation of the above. Graphs.

7121* Attempt at an Explanation of the Lanthanum-Sodium and the Lanthanum-Calcium Binary Systems. (In German.) Walter von Mässenhausen. *Zeitschrift für Metallkunde*, v. 43, Feb. 1952, p. 53-54.

Reports on experiments concerning the above which indicate that there is only a slight affinity between La and Na or Ca. Thermal analysis seems to indicate existence of a eutectic state which, however, could not be established by microscopic investigations.

7122* Two-Dimensional Electron Interferences in Irradiated Metal Layers. (In German.) H. Raether. *Zeitschrift für Naturforschung*, v. 7a, Feb. 1952, p. 210.

Shows that study of crystal lattices with electron interferences requires the use of monocrystals or monocrystal-like layers. Observations of such a study are briefly discussed. Includes schematic representation of the transmission diagram of Au-Cu layers in different irradiation directions.

Miscellaneous Publications

7123 Equilibrium Conditions With Iron-Chromium-Carbon Alloys. I. L. Mirkin and M. E. Blanter. Henry Brutcher, Translation No. 66, 10 pages. (From *Metallurg*, v. 15, no. 8, 1940, p. 3-8.)

Describes investigational procedure. Presents results of X-ray study of carbide phases near the iron end of Fe-Cr-C phase diagram; and of investigation of magnetic properties of these phases. Discusses differences between the diagram developed, and the currently accepted phase diagram. 12 ref.

See also:
6823 (phase diagrams of binary Pb alloys)
6957 (sintered aluminium for high temperatures)
7006 (microstructure of alloys for glass-metal seals)
7051 (structure of thin Sn films)
7082 (structure of Cu-Bi and Cu-Sb electrodeposits)
7088 (vapor-deposited Fe coatings, structure of)
7094 (crystal structure of electrodeposited Ag)
7129 (diagram of system Cu-Ga)
7155 (solid solubilities of Cd, In, and Sn in Al)
7175 (influence of microstructure on plastic flow)
7193 (structure of Cu-Al-Ni-Fe alloys)
7198 (microstructure of steel subjected to explosive attack)
7204 (microstructure of high-tensile steel)
7226 (micro-mechanism of weld fracture)
7230 (graphite formation in alloy cast iron)
7238 (microstructure of N-155 alloy)
7332 (crystallographic analysis with electron microscope)
7457 (microstructure of high-temperature alloys)
7469 (microstructure of cast iron)
7768 (structure of crystalline and amorphous forms of metals)

11. METALS—TRANSFORMATIONS AND RESULTING STRUCTURES

7124* Mechanism of the Influence of Preliminary Quenching on the Rate of Graphitization of Cast Iron. (In Russian.) K. P. Bunin and N. M. Danil'chenko. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 21, 1952, p. 381-383.

A study was made of the graphitization of white cast iron subjected to preliminary quenching and to isothermal treatment at 400°C. The large number of microscopic quenching cracks are considered as the sites for graphite nuclei, thus explaining the effect of preliminary quenching.

7125* Diffusion of Elements in Molten Iron. (In Russian.) B. V. Stark, E. V. Cheleshchev, and E. A. Kozachkov. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Nov. 1951, p. 1689-1695.

An experimental study was made of the above. Apparatus and method are described. Data are charted for diffusion of Mn and Si in Fe.

11. *Metals—Transformations and Resulting Structures*

7126* Discussion on Problems of the Theory of Phase Transformations in Steels and Alloys Concerning the Basic Ideas of the Theory of Phase Transformations in Solids. (In Russian.) V. I. Arkharov. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Nov. 1951, p. 1744-1751.

7127* Growth Spirals of Silicon Carbide Crystals. (In French.) Adrienne R. Weill. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 3, 1952, p. 1068-1070.

Discusses the theory of helical crystal growth beginning with dislocations which emerge at right angles to a crystallographic face, with respect to the different scales on which this phenomenom is observed on SiC crystals examined under the microscope by reflection without any preparation of the surfaces. Includes illustration.

7128 Removal of Embrittling Gases From Zirconium. W. C. Lilliendahl, E. D. Gregory, and D. M. Wroughton. *Journal of the Electrochemical Society*, v. 99, May 1952, p. 187-190.

A process is described for removal of dissolved O_2 from Zr by heating the solid metal in molten or gaseous Ca. Equilibrium O_2-Zr ratios were determined as a function of time and temperature of treating. N_2 is not removed in the treating cycle, and contamination of the treated metal with this impurity may occur. This may be prevented by careful control of treating temperatures. At high treating temperatures, the process may be used for removal of N_2 from Ca.

7129 The Equilibrium Diagram of the System Copper-Gallium in the Region 30-100 At.-% Gallium. J. O. Betterton and William Hume Rothery. *Journal of the Institute of Metals*, v. 80, Apr. 1952, p. 459-468.

Above was investigated and some information gained as to the constitution of the Ga-rich alloys. According to previous work a phase denoted δ, with a γ-brass structure, existed at low temperatures in the range 30-40 at.-% Ga and at high temperatures underwent a transformation into a phase denoted γ, whose structure was not determined. The present work shows that this transformation is an order-disorder change, and that the high-temperature γ phase has a typical γ-brass structure. Graphs and phase diagrams.

7130 Isothermal Mode of the Martensitic Transformation. E. S. Machlin and Morris Cohen. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 489-500.

A study of the above in a 71%-Fe, 29%-Ni alloy shows that martensite formation takes place mainly by nucleation of new plates. Nucleation is activated by thermal fluctuations superimposed on localized regions of very high strain. The reaction-path concept offers a unified picture of the kinetics. Tables, graphs, and 17 ref.

7131 Recrystallization of Aluminum Single Crystals After Plastic Extension. N. K. Chen and C. H. Mathewson. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 501-509.

Above was studied in relation to structure of the deformed matrix. Shapes of the new grains are analyzed with regard to slip planes and to presence or absence of deformation bands. A mechanism by which orientations of the recrystallized grains are related to the parent lattice is described. Tables, graphs, photographs, stereographic projections, and 14 ref.

7132 TTT-Diagrams for 7 and 9% Chromium Steels. Wm. L. Frankhouser and G. N. Emmanuel. *Metal Progress*, v. 61, May 1952, p. 74-79.

Gives experimental procedure and TTT-diagrams. Curves were constructed to represent the transformations involved. Micrographs.

7133 Isothermal Transformation of 9% Cr Steel. Wm. L. Frankhouser. *Metal Progress*, v. 61, May 1952, p. 96-B.

Data sheet giving TTT-diagram and photomicrographs.

7134 Preparation of Grey Tin. *Nature*, v. 169, Apr. 12, 1952, p. 621-622.

Describes method for transformation of ordinary commercial types of tin to the gray allotropic modification. Pure Sn (99.99%) is deformed by cold work and allowed to recrystallize at a temperature below the $\alpha \rightleftarrows \beta$ transformation temperature. For cooling, the tin may be packed in solid CO_2 during working.

7135* Twin Formation in Cadmium. N. Thompson and D. J. Millard. *Philosophical Magazine*, ser. 7, v. 43, Apr. 1952, p. 422-440.

Experiments on the formation of twins in single-crystal wires of Cd under tension demonstrate the essentially discontinuous nature of the process of twin growth, and produce evidence in favor of a critical resolved shear-stress law for twinning. Twinning can contribute to creep at room temperature but not at 90°A. A dislocation mechanism for the growth of a twin is discussed in some detail. 18 ref.

7136* Growth Spirals on Magnesium Crystals. A. J. Forty. *Philosophical Magazine*, ser. 7, v. 43, Apr. 1952, p. 481-483.

States that this is the first direct indication of the presence of screw dislocations in a simple metal crystal, though screw dislocations of large Burgers vector have been seen in chemically deposited gold. It is thought that the growth layers are either one or two atoms in thickness.

7137* Research on the State of Orientation of the Gold-Copper Alloy $AuCu_3$ With the Aid of Electron Interferences. (In German.) H. Raether. *Zeitschrift für angewandte Physik*, v. 4, Feb. 1952, p. 53-59.

Describes experimental study of the order-disorder transformation of thin vapor-deposited $AuCu_3$ films below, at, and above the critical temperature. Results are evaluated. Includes electron micrographs and diagrams. 15 ref.

7138* Concentration of Crystal Nuclei During Their Separation From Supersaturated Solid Solutions. (In German.) Erich Scheil. *Zeitschrift für Metallkunde*, v. 43, Feb. 1952, p. 40-41.

Discusses the above, on the basis of the Becker theory of separation of homogeneous solid solutions. Recommends further investigation of the growth process, in order to clarify W. Gerlach's observations on Au-rich, Au-Ni solid solutions. Graphs indicate dependence of precipitation upon concentration.

7139* A Crystal Growth Phenomenon in Antimony-Lead-Tin Alloys. (In German.) Karl Löhberg and Elisabeth Schulz. *Zeitschrift für Metallkunde*, v. 43, Feb. 1952, p. 50-53.

Describes dependence of crystal structure of Sb-Pb-Sn and Sb-Tl-Sn alloys on Sn content. Effects of small amounts of S, Se, or Te were also determined.

7140* The Shape of the Solidification Curve of High-Purity Aluminum Crystals and the Formation of Deformation Curves. (In German.) Kurt Lücke and Hansheinz Lange. *Zeitschrift für Metallkunde*, v. 43, Feb. 1952, p. 55-66.

The above was investigated during tensile stress. Shapes of the solidification curves of various metals are indicated. The process of solidification is discussed. Deformation bands, and the mechanism of their formation, are outlined. Diagrams and micrographs.

Miscellaneous Publications

7141 A Study of the Formation of Nodular Graphite. Fredrik Hurum. American Foundrymen's Society, Preprint 52-75, 1952, 14 pages. (TS200 Am35t)

Various grades of pig iron were remelted in an induction furnace. Sillimanite crucibles were used and the charges varied from 2 to 6 lbs. Different methods were used to add Mg and ferrosilicon to the melt. Telescopic test-pieces having diameters of 5, 10, 20 and 40 mm. and test bars of 20-mm. diam. were cast in graphite and core-sand molds. Several melts of synthetic cast iron were also made and treated in various ways. Micrographs and diagrams. 11 ref.

7142 Kinetics of Martensite Transformation at Temperatures Above Room Temperature. G. V. Kurdyumov and O. P. Maksimova. Henry Brutcher, Translation No. 2844, 8 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 81, Dec. 1, 1951, p. 565-568.)

Previously abstracted from the original.

7143 A Study of the Nucleation and Growth Processes in the Synthesis of Colloidal Gold. John Turkevich, Peter Cooper Stevenson, and James Hillier. *Discussions of the Faraday Society*, no. 11, 1951, p. 55-75. (TK1 F22d)

Includes graphs and electron micrographs. 31 ref.

7144 Abnormal Grain Growth in S-816 Alloy. A. I. Rush, J. W. Freeman, and A. E. White. National Advisory Committee for Aeronautics, Technical Note 2678, Apr. 1952, 30 pages. (TL570 Un3t)

Presents results obtained to date in an investigation to establish the fundamental causes of the above under conditions encountered during forging of blades for the gas turbine of jet engines. Abnormal grain growth was induced by temperature cycling alone. Water-quenching of the bar stock from 2150 or 2300°F rendered the samples susceptible to abnormal grain growth upon reheating to 2300° F. Air cooling was sufficient to induce grain growth during subsequent solution treatment for some of the prior treatments. Diagrams and micrographs.

See also:

6953 (austenite transformation in surface layer of steel tools)
6966 (diffusion during sintering of Ni-Zn alloy)
7035 (isothermal transformations of steel)
7171 (sulfur pickup of Fe, Ni, and alloys)
7173 (phase equilibria in metals and alloys)
7238 (aging of N-155 alloy)
7861 (diffusion in metals)
8170 (transformation caused by α-particle bombardment)

12. METALS—PHYSICAL PROPERTIES AND TESTS

7145* Variation of Electrical Resistance of a Fe_3Pt Alloy in Linear Magnetic Fields. (In Russian.) R. G. Annaev, V. G. Dubrovskii, and E. K. Kapustian. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 1, 1952, p. 549-552.

The electromagnetic properties of an Fe_3Pt alloy wire were studied over a range of magnetic fields and annealing temperatures (effect of ordering). Data are discussed and charted. 10 ref.

7146* Thermomagnetic Effect in Fe-Pt Alloy. (In Russian.) R. G. Annaev and M. V. Kolodin. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 11, 1952, p. 697-700.

The effect of ordering (annealing temperature) and strength of the magnetic field on the above was studied. Data are discussed and charted. 10 ref.

7147* Determination of Surface Tension of Materials at Their Melting Points. (In Russian.) V. I. Smirnova and B. F. Ormont. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 11, 1952, p. 751-753.

A method for the above is described. The equations used to calculate values are discussed. Experimental data are tabulated for the metals Fe, Ni, Au, Ag, Sn, and Bi.

7148* Investigation of the Temperature Dependence of the Hall Effect in Electrolytic Iron. (In Russian.) V. V. Parfenov and V. R. Abel's. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 21, 1952, p. 877-879.

Data on the above are discussed and charted.

7149* Thermal and Thermoelectric Properties of Ferromagnetic Metals. A. I. Rezanov. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 21, 1952, p. 885-887.

A theoretical, mathematical analysis.

7150 The Heat of Solution of Neptunium Metal and the Heats of Formation of Some Neptunium Chlorides. A Microcalorimeter for Heat of Solution Measurements. Edgar F. Westrum, Jr., and LeRoy Eyring. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2045-2047.

Above properties were determined. A convenient precise calorimeter suitable for determination of heats of relatively rapid reactions for milligram quantities of materials is described and its performance indicated. Apparatus diagram and tables. 13 ref.

7151 Study of Magnetic Fields at a Crack in a Magnetized Steel Plate. R. D. Kodis and G. A. Darcy. *ASTM Bulletin*, Apr. 1952, p. 71-73.

A synthetic crack of varying depth in a steel plate was produced, and the magnetic field leakage around this crack studied by means of a magnetic tape-recording head. The magnetic leakage field was measured with respect to depth of crack, level of magnetizing force applied to the steel plate, and distance of the search head above the cracked plate.

7152* Electrical Properties of Very Thin Silver, Aluminum, and Silicon Films. (In French.) André Blanc-Lapierre, Marcel Perrot, and Jean-Pierre David. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 10, 1952, p. 1133-1135.

Conductivity, at ordinary temperature, of thin pieces of Ag, Al, and Si, obtained by evaporation in a vacuum, was determined. Graphs and table.

7153* Study of Thin Strips of Mumetal Subjected to Weak Alternating Fields as a Function of Temperature. (In French.) Claude Abgrall and Israël Epelboin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 17, 1952, p. 1265-1267.

Calculation of the Foucault current applied to a homogeneous permanent magnet does not agree with that observed experimentally. This anomalous relationship between resistivity measured directly and that deduced by calculation was studied for Mumetal containing Mo and annealed at 1100°C.

7154* Thermomagnetic Study of Metallic Praseodymium. (In French.) Charlotte Henry la Blanchetais. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 24, 1952, p. 1353-1354.

Describes the above showing that, within a very wide temperature range, metallic Pr follows the Curie-Weiss law. It has a moment very close to that of Pr^{+++} ion, and behaves, from this point of view, like Ce or Nd. Includes graph.

7155 The Solid Solubilities of Cadmium, Indium, and Tin in Aluminium. H. K. Hardy. *Journal of the Institute of Metals*, v. 80, Apr. 1952, p. 431-434.

The solid solubilities of Cd, In, and Sn in Al at 530°C. and above were estimated metallographically on electropolished specimens. 24 ref.

7156 Influence of Cold-Work on the Hall Effect of a Metal. Bernard Wiener and Gerhart Groetzinger. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 441-444.

A study of the above for Cu to better understand the mechanism of cold-work. Measurements made also on change of conductivity. Circuit diagram and tables.

7157* Some Electrical Properties of Industrial Colloidal Silver. (In French.) R. Bedos. *Journal de Chimie physique et de Physico-Chimie biologique*, v. 49, Mar. 1952, p. 93-98.

The behavior of a sol of silver subjected to an alternating field of variable frequency was studied by determining the variation of the complex impedence of a measuring cell containing the Ag sol. Contains charts and diagrams.

7158 Recovery of the Resistivity of Metals After Cold-Working. *Nature*, v. 169, Apr. 12, 1952, p. 623.

Describes measurements on the recovery of the electrical properties of Au, Ag, and Cu wires. Graph shows the results.

7159* Experiments on the Electrical Resistivity of Metals. D. K. C. MacDonald. *Philosophical Magazine*, ser. 7, v. 43, Apr. 1952, p. 479-481.

It has been found possible to adapt a Collins helium liquefier so that electrical-conductivity measurements may be carried out continuously from room temperature down to liquid-He temperature range in a single experiment with very satisfactory accuracy. Briefly reports some measurements on Rb.

7160 Phase Transitions in Adsorbed Films. Lothar Meyer and Earl Long. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1035-1037.

A thermodynamic treatment of first- and second-order transitions in adsorbed layers is given. The results are compared with the experimental evidence for the melting of argon and the transition of He I-He II in adsorbed layers.

12. *Metals—Physical Properties and Tests*

7161 Radiations of Rh^{99}, Rh^{101}, Rh^{105}, and Ru^{105}. C. L. Scoville, S. C. Fultz, and M. L. Pool. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1046.

Ruthenium metal of high purity was bombarded with 6.3-Mev protons and 10-Mev. deuterons and the spectra of the activities obtained were examined in a 180° beta-ray spectrometer. The spectrometer sources consisted of the activated metal spread out evenly on thin Zapon foil ribbons. The source and backing had a thickness of about 15 mg/cm^2.

7162 Energy Absorption During Twin Formation in Zinc Single Crystals. E. I. Salkovitz. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1046-1047.

Above was measured by means of ballistic pendulums in measuring the energy absorbed during kink formation in Zn and Cd.

7163 The Scattering of 9.6-Mev Protons by Carbon, Aluminum, and Magnesium. C. J. Baker, J. N. Dodd, and D. H. Simmons. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1051-1052.

A remotely controlled scattering chamber was used to investigate the scattering of 9.6-Mev protons by some light nuclei. The source of protons was the extracted beam of the Birmingham 60-in. cyclotron. The scattered particles were detected by a counter telescope consisting of 3 proportional counters which fed a flexible coincidence or anti-coincidence circuit.

7164 Domain Patterns on FeSi Crystals. C. E. Ying, S. Levy, and R. Truell. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 133-134.

Briefly discusses several interesting patterns found in a study of effect of magnetic history. Crystals contained 3.8% Si. Photomicrographs.

7165* Experimental Study of Ferromagnetic Domains. (In French.) L. F. Bates. *Revue de Métallurgie*, v. 49, Mar. 1952, p. 185-194.

Presents results of a study of "Bitter figures"—obtained by use of a colloidal powder placed on the surface of ferromagnetic metallic crystals. The surface is prepared by an electropolishing procedure. Apparatus is diagrammed. Typical Bitter figures are presented and explained for Si iron and for Co. Effect of inclusions is shown. 14 ref.

7166 Some Magnetic Properties of Metals. I. General Introduction, and Properties of Large Systems of Electrons. II. The Influence of Collisions on the Magnetic Behaviour of Large Systems. R. B. Dingle. *Proceedings of the Royal Society*, v. 211, ser. A, Mar. 20, 1952, p. 500-525.

Gives detailed mathematical, theoretical treatment of the above. Part I includes a survey of problems to be covered in papers to be published later. 42 ref.

7167 Some Magnetic Properties of Metals. III. Diamagnetic Resonance. IV. Properties of Small Systems of Electrons. R. B. Dingle. *Proceedings of the Royal Society*, ser. A, v. 212, Apr. 8, 1952, p. 38-65.

Shows that electromagnetic radiation incident on a large system of electrons moving in a constant magnetic field H in a metal is strongly absorbed near a frequency $\nu = eH/\pi mc$, where m is the effective mass. Part IV consists of a calculation of the magnetic properties of a system of electrons contained within a cylinder of very small radius with its axis parallel to the field direction. The influence of electron spin on both steady and periodic terms is discussed.

7168* Temperature Effects of Bismuth. (In German.) Hans Meissner. *Zeitschrift für angewandte Physik*, v. 4, Feb. 1952, p. 59-60.

Describes briefly effect of temperature and time of annealing on the electrical resistance of Bi wire. Data are graphed.

7169* Theory of the Electrical Conductivity of Metals. I. (In German.) H. Koppe. *Zeitschrift für Naturforschung*, v. 7a, Feb. 1952, p. 156-161.

Continuation of a previous article of same title discusses a new definition of surface distribution and method of computing the diffusion constant, showing that a scalar diffusion constant can be obtained under certain simplified assumptions. Computation is based on numerous approximations, such as free electrons, low current strengths, and diffusion approximation.

7170* Results of Low Temperature Research. IV. Atomic Heat of Cobalt Between 15 and 270°K. (In German.) Klaus Clusius and Liselotte Schachinger. *Zeitschrift für Naturforschung*, v. 7a, Feb. 1952, p. 185-191.

Above was experimentally investigated in order to study further the great effect of electrons on the specific heat of ferromagnetic metals. Tables and graphs. 13 ref.

7171* The Mechanism of Sulfur Pickup of Iron, Nickel, and Nickel Alloys at Elevated Temperatures. (In German.) K. Hauffe and A. Rahmel. *Zeitschrift für physikalische Chemie*, v. 199, Jan. 1952, p. 152-169.

Describes experiments made to determine rate of the above, as a function of temperature and pressure. Diagrams and graphs. 43 ref.

Miscellaneous Publications

7172 Study of the Most Suitable Chemical Composition of 4%Cr, 2%Co, 0.5%W Permanent Magnet Steel. W. Knorr. Henry Brutcher, Translation No. 2855, 4 pages. (From *Archiv für das Eisenhüttenwesen*, v. 23, Jan.-Feb. 1952, p. 53-55.)

Previously abstracted from the original.

Books

7173 Thermodynamics of Alloys. John Lumsden. 384 pages. 1951. Institute of Metals, London. (TN690 L97t)

Deals with the application of thermodynamics to the quantitative study of phase equilibria in metals and alloys. Emphasis is laid on the usefulness of thermodynamics for the accurate correlation of various equilibrium properties. The fundamental theory of the subject is presented first, and then some illustrative calculations on actual metals and alloys are worked out in detail. Finally, the interpretation of thermodynamic parameters in terms of statistical mechanics is discussed.

See also:

6836 (properties of rare earth)
6957 (sintered aluminum for high temperatures)
6960 (density and other properties of iron-powder parts)
6965 (properties of Si carbide)
7006 (properties of alloys for glass-metal seals)
7008 (steel and Cu alloys)
7051 (specific resistance of thin Sn films)
7054 (deposition potential of Pa on various metals)
7069 (photoconductivity in Se films)
7106 (ferromagnetism of Fe amalgam)
7175 (properties of Cu and Al)
7190 (electrical conductivity of Cu-base alloys)
7221 (heat resistance of carbides)
7459 (Cu and Al)
7540 (resistance-heating properties of mild steel)
7812 (adsorption of polar organic compounds on steel)
7933 (plastic and metal wings)
8163 (neutron scattering by Ni and Mg)
8171 (electrical resistance of Cd-Sb alloys)
8217 (permanent magnet testing)
8235 (properties of magnets from iron powder)
8255 (dielectric properties of steel-quartz cubic arrays)
8336 (thermal emissivities of metals)

13. METALS—MECHANICAL PROPERTIES AND TESTS

7174* The Mechanism of Fatigue. P. Litherland Teed. *Aeroplane*, v. 82, Apr. 25, 1952, p. 484, 487.

Reviews research since 1849 in elucidation of the above. Deals with metallic structure, intercrystalline boundaries, non-uniform distribution of stress, plastic flow, and some experimental results. 10 ref.

7175* Influence of the Dispersion (Microstructure) of a Metal on Its Plastic Flow in Active Media. (In Russian.) T. A. Amfiteatrova and B. Ia. Iampol'skii. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 11, 1952, p. 735-738.

The influence of surface-active materials on the creep of

polycrystalline Cu and Al was investigated using a special apparatus, in contact with kerosene; butyl hexyl, octyl, and cetyl alcohol, oleic acid, and dioctyl sulfosuccinate were investigated. Data are tabulated and charted; apparatus is diagrammed.

7176* Brittle Fracture of Metals. (In Russian.) G. V. Uzhik. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Sept. 1951, p. 1390-1414.

An answer to comments by N. N. Davidenkov on a previous article by the author. Stresses in notched bars and similar questions are discussed. 30 ref.

7177* Discussion of Work of G. V. Uzhik in the Field of Problems of Strength and Plasticity. Concerning the Paper by V. I. Kudriavtsev, "Dependence Between Uzhik's Resistance to Fracture". (In Russian.) G. V. Uzhik, *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Oct. 1951, p. 1567-1572.

Presents the authors answer to Kudriavtsev's criticisms. Data are tabulated.

7178* Concerning N. P. Shchapov's Letter. (In Russian.) G. V. Uzhik. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Oct. 1951, p. 1574-1578.

Answer to Shchapov's criticism of the author's theory of strength.

7179* Bending as a Test Method For Cast Aluminum Alloys. (In Italian.) F. Gatto. *Alluminio*, v. 21, Jan. 1952, p. 15-25.

Discusses application of static bend tests for the above. Calculations, tables, diagrams, and graphs.

7180 Experimental Study of Sliding Friction. Charles A. Maney. *American Journal of Physics*, v. 20, Apr. 1952, p. 203-210.

Shows that the above is not a constant but varies with several factors. Pb, Al, steel, brass, and some nonmetals were studied. Tables and graphs.

7181 A Criterion For the Failure of Cast Iron. John C. Fisher. *ASTM Bulletin*, Apr. 1952, p. 74-75.

Discusses and presents experimental results to substantiate the theory that failure of cast iron is governed by the laws of plastic deformation.

7182* Creep of Metals. *Automobile Engineer*, v. 42, Apr. 1952, p. 154-156.

Discusses the application of creep data to design problems. Graphical data on carbon steel.

7183* Bend Tests During Gas Pressure Welding of Tubes. (In Russian.) S. M. Skorodzievskii. *Avtogennoe Delo*, v. 22, Oct. 1951, p. 22-23.

Tests were made on two lots of butt-welded steel tubes. Tables and graphs.

7184* The Problem of the Number of Cycles During Fatigue Testing of Welded Joints. (In Russian.) V. I. Shabalin. *Avtogennoe Delo*, v. 22, Nov. 1951, p. 4-5.

Discusses determination of the number of cycles of stress application necessary to indicate the fatigue strength of welds, particularly in steel of the "Chromansil" type. Tables, graphs, and photomicrographs.

7185 Summarized Proceedings of a Conference on Stress Analysis, Liverpool, 1951. *British Journal of Applied Physics*, v. 3, Apr. 1952, p. 105-114.

Nine papers, dealing with numerical methods, electric-resistance, strain-gage methods, developments in France, fatigue, and photoelastic work are summarized. Diagrams and illustrations. 11 ref.

7186 Methods for the Improvement of Drill-Collar Joints Evaluated by Full-Size Fatigue Tests. L. E. Thrishman. *Drilling*, v. 13, Apr. 1952, p. 99-100, 102; disc., p. 103.

Presents information regarding possible methods of improvement, applicable to almost any joint design, and shows by full-size fatigue tests what these methods will contribute in the way of increased resistance to fatigue failure of drill-collar joints. Graphs and diagrams.

7187 Effects of Working on the Properties of Molybdenum. E. S. Byron and R. F. Baker. *Journal of the Electrochemical Society*, v. 99, May 1952, v. 194-196.

Solid ingots of Mo were prepared by powder metallurgy. Two wedges were machined. These were rolled to ⅝ in. thickness at 1200°C. in a single pass. One wedge was air-cooled after rolling and the other was annealed for 1 hr. at 950°C. Degree of height reduction, hardness measurements, and tensile tests of properties transverse to rolling direction were made.

7188* Statistical Study of the Correlation Between the Composition of an Ordinary Cast Iron and Its Mechanical Properties. (In French.) Jorgen Drachmann. *Fonderie*, Jan. 1952, p. 2755-2762.

The relationship between chemical composition, machinability, Brinell hardness, and the depth of hardening of an ordinary cast iron were investigated. Data are charted.

7189* French Position With Respect to Mechanical Tests For Acceptance of Gray Cast Iron Pieces. (In French.) Etienne Doat. *Fonderie*, Mar. 1952, p. 2846-2850.

Surveys the above. Tables and diagrams.

7190* Copper Alloys With Improved Mechanical Properties and Electrical Conductivity. (In Czech.) Ferd. Králik. *Hutnické Listy*, v. 7, Feb. 1952, p. 71-72.

Above properties of various Cu-Cd, Cu-Ag-Cd, Cu-Cr, Cu-Ni-Si, Cu-Be, and Cu-Ag alloys.

7191* Effect of Individual Factors in Microhardness Tests. E. M. Shvetsova and T. V. Lebedeva. *Industrial Diamond Review*, v. 12, Mar. 1952, p. 50-52.

A study of the factors of inaccuracies in working the microhardness tester, peculiarities of single crystals, effect of varying strength of grains, non-uniformity in structure of metal, and change generally in test-pieces at surface or otherwise.

7192 The Effect of Grain-Size on the Structural Changes Produced in Aluminium by Slow Deformation. W. A. Rachinger. *Journal of the Institute of Metals*, v. 80, Apr. 1952, p. 415-418.

X-ray diffraction and metallographic methods were used to study the internal derangement of Al polycrystals of various grain-sizes after slow deformation at elevated temperatures. The present work indicates that, for a given temperature and rate of straining, the effect of an increase in grain-size is roughly equivalent to a decrease in temperature or an increase in strain rate. Further evidence is produced to confirm the existence of a deformation-induced substructure within the grains.

7193 Observatons on the Structure and Properties of Wrought Copper-Aluminium-Nickel-Iron Alloys. Maurice Cook, W. P. Fentiman, and Edwin Davis. *Journal of the Institute of Metals*, v. 80, Apr. 1952, p. 419-429.

A study was made of the structure and properties of complex Al bronzes containing 8-12% Al and 4-6% each of Ni and Fe. The mechanical properties of alloys containing 8, 10, and 12% Al with 5% each of Ni and Fe, representative of the 3 main structural classes, were determined in the quenched, quenched and tempered, hot-rolled, and hot-rolled and annealed conditions; and these properties are related to the structures. The effect of cold-rolling on the mechanical properties of this alloy was determined, and the structure and properties of extruded and annealed rod studied. 10 pages of photomicrographs.

7194 Impact Strength of 4140 v. TS 4140 Reported. *Iron Age*, v. 169, Apr. 24, 1952, p. 148.

Presents results in graphical form and gives brief description of test conditions.

7195 Production Problems. XIV. Hard and Soft Blake Hooks. *Iron and Steel*, v. 25, Apr. 1952, p. 129-130.

Due to variation in the hardness of fully processed Blake hooks after heat treatment, a general hardness survey was made on selected hooks, and in addition, hardness tests were carried out on the hook and results are discussed.

7196 The Deformation of Low-Carbon Steel in the Blue-Brittle Range. E. O. Hall. *Journal of the Iron and Steel Institute*, v. 170, Apr. 1952, p. 331-336.

A study of the Lüders deformation of Bessemer and Armco

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iron wires and thin strip. Jagged stress/strain curves arise from interrupted propagation of fronts of the Lüders bands, and from formation of new bands in strain-aged materials. Photographs.

7197 The Elastic Constants of Nickel. J. R. Neighbours, F. W. Bratten, and Charles S. Smith. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 389-393.

Above were determined by the pulsed ultrasonic method. Wave-velocity measurements on four Ni single crystals of general orientation, which were magnetically saturated, were combined by the approximation method. Tables and graphs. 12 ref.

7198 Deformation and Fracturing of Thick-Walled Steel Cylinders Under Explosive Attack. John Pearson and John S. Rinehart. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 434-441.

A study of the above which were internally loaded by explosive charges. Cylinders made of 1020 steel with wall thickness range 1½ to 4 inches. Discusses microstructure analysis of fragments and strain measurements. Graphs, photographs, and photomicrographs. 20 ref.

7199 Elastic Constants of Beta-Brass Single Crystals. Robert A. Artman and Donald O. Thompson. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 470-474.

A study showing dependence of elastic constants upon composition. Moduli for different compositions may be obtained by use of a linear interpolation in terms of the atomic ratio of Cu to Zn. Presents results of bending-torsion measurements and discusses agreement between measured and calculated values. Graphs, diagrams, and tables. 13 ref.

7200 Temperature Dependence of Young's Modulus and Internal Friction of Single Crystals of Beta-Brass. Robert A. Artman. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 475-482.

A study of the above using a composite piezoelectric oscillator. Modulus measurements were made in the range 25-480°C. and internal friction at 21 and 42 kc. per sec. from room temperature to above the critical temperature of order-disorder. Also considers effects of inclusions on the α-phase. Graphs, table, and photomicrograph. 13 ref.

7201* A Cause of Brittleness in Stainless Steels. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 24, Mar. 29, 1952, p. 99-100.

Deals with the sigma phase in reference to ductility of Fe-Cr or Fe-Cr-Ni alloys at high temperatures.

7202 Some Observations on the Determination of Residual Stresses in Cylindrical Metal Bodies by Sachs' Boring Method. R. A. Dodd. *Metallurgia*, v. 45, Mar. 1952, p. 109-114.

A critical, general discussion and a proposal of an experimental technique for the above. Gives data concerning strains introduced by machining process; use of strain gages; and comparison with X-ray measurements. Tables, graphs, and photographs.

7203 The Determination of Local Wear by the Use of Disappearing Marks. *Metallurgia*, v. 45, Mar. 1952, p. 151-153.

Discusses various methods for the above which utilize measurements on a depression made in a surface. Includes a brief digest of a Russian-reported "cut lune" method. Photomicrographs.

7204 Stress-Strain Relationship of a High-Tensile Weldable Structural Steel. D. W. Smith, J. G. Whitman, and C. L. M. Cottrell, *Metallurgia*, v. 45, Apr. 1952, p. 169-172.

Describes an investigation on the above, up to 0.3% proof stress, of a low-carbon, Mn-Mo steel being considered for use in construction of a prefabricated transportable bridge. Gives data for as-rolled and heat-treated conditions. Discusses microstructure. Tables and graphs.

7205* Fatigue-Test Programming. Variable-Amplitude Rotating Bend Tests. (In Italian.) Luigi Locati. *Metallurgia Italiana*, v. 44, Apr. 1952, p. 135-144.

Variation in stresses imposed on the samples was found to differ greatly from that expected on the basis of the sine-wave function. Following a review of work to date on non-sinusoidal fatigue, a new apparatus is described by which rotating bend tests with stresses varying with time can be carried out according to a pre-established program. Results for a series of carbon, low-alloy, and stainless steels, and for an Al-base alloy are tabulated, charted, and discussed. A "training" effect encountered is described. It disappears on aging treatment, even at very low temperatures, hence is believed to be due to internal stresses caused by internal creep of the grains. 22 ref.

7206 Some Problems in the Fabrication of N-155 Alloy. Hiram Brown. *Metal Progress*, v. 61, May 1952, p. 67-72.

Describes above and their solution as encountered in early usage of this material. Includes mechanical properties, surface defects, and variations in heat treatment. Tables and photomicrographs.

7207 Grain Displacement in Metal Stressed Below Elastic Limit. Norman P. Goss. *Metal Progress*, v. 61, May 1952, p. 87-91.

A study by X-ray diffraction methods of movements within the mosaic substructure of coarse-grained metal under moderate stress. Materials were 3%-Si steel and high-purity annealed Fe.

7208* Contribution to the Study of the Resistance of Unalloyed Carbon Steel in the Case of Hydrostatic Deformation. (In French.) H. Böhler and E. H. Schulz. *Métaux: Corrosion—Industries*, v. 27, Feb. 1952, p. 49-53.

Discusses the cohesive strength of steel as a function of carbon content, and the influence of rather high temperatures on this property. Tables and graphs. 12 ref.

7209* Some Factors Affecting the Creep Resistance of Heat-Resistant Austenitic Alloys. (In French.) Xavier Wache. *Métaux: Corrosion—Industries*, v. 27, Feb. 1952, p. 56-68.

Presents results of the thermomagnetic analysis of carburized austenitic steels and of physicothermal analysis of austenites hardened by addition of Ti and Al. Includes charts, micrographs, and tables.

7210* Properties and Uses of Nickel and Its Alloys. W. H. Dennis. *Mine & Quarry Engineering*, v. 18, Mar. 1952, p. 73-80; Apr. 1952, p. 123-128.

A general discussion of the above. Includes illustrations, graphs, and tabular data.

7211 Effect of Surface Films on the Twinning of Metal Crystals. Ronald King. *Nature*, v. 169, Mar. 29, 1952, p. 543-544.

Electrodeposited layer of Cu raises the stress necessary to cause twinning in single crystals or Zn. Long single crystals, 1 mm. in diameter, were grown and cut into several lengths which were given different surface treatments. The specimens were then tested in tension in a rigid frame apparatus in which the strain was brought about by means of a micrometer screw movement. A Polanyi beam was used for measuring the stress with a high degree of sensitivity. Stress-strain curves were obtained, and the onset of twinning, being accompanied by a sudden drop in stress, was readily detected.

7212* Interferometric Studies of Hardness Test Indentations: Investigations on Tungsten Carbide, Steel, Duraluminium and Tin. S. Tolansky and D. G. Nickols. *Philosophical Magazine*, ser. 7, v. 43, Apr. 1952, p. 410-421.

Studies were made on the surface distortions which occur on metal surfaces which have received hardness-test indentations from both diamond-pyramid and diamond-cone indenters. 11 ref.

7213 Elastic and Plastic Properties of Very Small Metal Specimens. Conyers Herring and J. K. Galt. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1060-1061.

Above properties were investigated by performing experiments on the thin whiskers which grew out from the surfaces of a number of low-melting-point metals. Observations were made on some Sn whiskers grown from a Sn-plated surface.

7214 The Nature of Work-Hardening. J. S. Koehler. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 52-59.

Theoretical study of above mainly concerned with source-hard-

ening. Comparison of theory and experiment for Al single crystals. Graphs and diagrams.

7215* A Theoretical Estimate of the Effect of Radiation on the Elastic Constants of Simple Metals. G. J. Dienes. *Physical Review*, ser. 2, v. 86, Apr. 15, 1952, p. 228-234.

Gives approximate theoretical treatment of a change in elastic constants of simple metals caused by presence of a given small fraction of interstitial atoms and vacancies. Elastic constants are calculated from interatomic potentials employing a simple exponential function for Cu and a Morse function for Na. Tables and graphs. 18 ref.

7216 Note on Embrittlement From Alkaline Tin Plating. C. A. Zapffe and M. E. Haslam. *Plating*, v. 39, May 1952, p. 468-469, 485.

Gives results for stainless and carbon steel in two sodium stannate baths.

7217 Fatigue Properties of Cast Aluminum Alloys. R. L. Templin, F. M. Howell, and J. O. Lyst. *Product Engineering*, v. 23, May 1952, p. 119-123.

Extensive tests on 28 alloys cast in sand molds and 17 alloys cast in permanent molds reveal there are no pronounced differences in their fatigue strengths. Table lists nominal compositions and tensile properties for fatigue-test conditions. Some of the alloys were tested as sand castings, some as permanent mold castings, and several as both types of castings. The wide ranges of tensile properties resulting from heat treatment are particularly noteworthy. These differences in static property values are not reflected in the fatigue strengths of the alloys. Graphs.

7218* Hardness and Strength Properties of Metal. (In French.) D. Tabor. *Revue de Métallurgie*, v. 49, Mar. 1952, p. 208-210.

Presents a brief theoretical discussion of the relation between the elastic limit and the hardness of metal. Tables and graphs.

7219 The Elastic Stability of Bent I-Section Beams. J. F. Davidson. *Proceedings of the Royal Society*, ser. A, v. 212, p. 80-95.

When made into extruded girders, Al is subject to instability, because of its low modulus and of the thin-walled sections which can be produced. An experimental and theoretical investigation of the instability of such girders is presented.

7220 Improved Method for Estimating Fatigue Life of Bevel and Hypoid Gears. Wells Coleman. *SAE Quarterly Transactions*, v. 6, Apr. 1952, p. 314-331.

Explains above method. A graph is plotted using calculated stress and number of cycles to failure resulting from extensive bending-fatigue tests on both bevel and hypoid gears. With the aid of this graph, fatigue life of new gear designs may be estimated. Numerous graphs, formulas, and diagrams.

7221 Cemented Carbide Families Grow. J. S. Gillespie and I. L. Wallace. *Steel*, v. 130, Apr. 21, 1952, p. 84.

Discusses the above. Includes new developments, properties, corrosion and heat-resistance data, and applications.

7222* Fatigue Tests on Aluminum Alloy Spot-Welded Joints. Marshall Holt and E. C. Hartmann. *Welding Journal*, v. 31, Apr. 1952, p. 183s-187s.

A comparison of results of fatigue tests of spot-welded joints in sheets of various high-strength Al alloys, 10 ref.

7223* Fracture Initiation and Propagation in Welded Ship Steels. P. J. Rieppel and C. B. Voldrich. *Welding Journal*, v. 31, Apr. 1952, p. 188s-198s; disc., p. 198s-201s.

The initiation and propagation of fractures in welded and prime-plate Kinzel-type transversely notched bead-bend specimens were investigated. Results suggest that the data from many welded test specimens be re-examined in light of data presented in this paper. It seems likely that poor performance, which has been believed to be caused by heat-affected zones, may in reality be directly related to weld-metal performance.

7224* Upper and Lower Transitions in Charpy Tests. Discussion. R. W. Vanderbeck and W. P. Roop. *Welding Journal*, v. 31, Apr. 1952, p. 201s-204s.

Paper discussed was published in Sept. 1951 issue p. 417s-422s.

7225* Residual Stress and the Yield Strength of Steel Beams. Ching Huan Yang, Lynn S. Beedle, and Bruce G. Johnston. *Welding Journal*, v. 31, Apr. 1952, p. 205s-229s.

Analytical and experimental study of the elastic and plastic behavior of welded continuous steel beams. Stress concentration, residual stresses, and other factors which affect the yield strength of steel members are discussed. Basic assumptions of the simple plastic theory are compared with the test results. The influence of residual stress on buckling strength of columns is also included. Numerous tables, graphs, diagrams, and photographs. 22 ref.

7226* The Micro-Mechanism of Fracture in the Tension Impact Test. Discussion. Glenn W. Geil. *Welding Journal*, v. 31, Apr. 1952, p. 230s-231s.

Paper discussed was published in v. 30, Sept. 1951, p. 459s-469s.

7227* Origin and Prevention of Stress Patterns on German Silver and Brass. (In German.) Richard Ergang and Stefan Welz. *Zeitschrift für Metallkunde*, v. 43, Feb. 1952, p. 45-49.

The behavior of German silver and brass is shown to be analogous to that of steel. Data are charted; micrographs illustrate the article.

7228* Significance of Dependence of Work-Hardening Curves of Aluminum Monocrystals on Orientation. (In German.) P. Haasen and G. Leibfried. *Zeitschrift für Physik*, v. 131, no. 4, 1952, p. 538-543.

Strength increase is ascribed to effective shear stresses along slip planes which prevent slipping in the regular slip system. Graphs and tables. 12 ref.

7229* Measurement of Residual Stresses in Rods and Tubes by Means of Expansion Strips. (In German.) Hans Buhler and Walter Schreiber. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Mar. 11, 1952, p. 216-218.

Describes use and advantages of the above as compared to mechanical-expansion meters. Details of the measuring process are indicated; data are tabulated and charted.

Miscellaneous Publications

7230 Effects of Cerium on Graphite Formation in Alloy Cast Iron. Edward A. Rowe and Howard A. Johnson. American Foundrymen's Society, Preprint 52-1, 1952, 5 pages. (TS200 Am35t)

Concerned with the effect of Ce on an alloy cast iron containing Ni, Mn, and Mo. Changes in graphite structure, tensile strength, and hardness caused by the Ce additions were observed. Addition of a secondary graphitizing inoculant with the Ce is also discussed. Micrographs and tables.

7231 A Test for Hot Tearing Tendency. E. A. Lange and R. W. Heine. American Foundrymen's Society, Preprint 52-14, 1952, 14 pages. (TS200 Am35t)

Test apparatus and procedure. Results with white cast irons. Graphs, diagrams, tables, and illustrations.

7232 Zinc in Aluminum Casting Alloys. Donald L. Colwell. American Foundrymen's Society, Preprint 52-38, 1952, 8 pages. (TS200 Am35t)

Data presented show that, in nominal quantities in excess of most current specifications, Zn has a beneficial effect on mechancal properties and machinability and no adverse effects on castability or corrosion resistance. Emphasis is on the common Cu-Si casting alloys, both in the as-cast and heat-treated conditions. The danger in Mg as an impurity is mentioned, particularly in alloy CS64C, and also the neutral effects of Zn on alloy S5C. Numerous examples are given graphically.

7233 High Strength Nonheat-Treated Aluminum Casting Alloys. Walter Bonsack. American Foundrymen's Society, Preprint 52-44, 1952, 7 pages. (TS200 Am35t)

Surveys compositions and properties of the above, comparing the modern Al-Mg-Zn types with the older heat-treatable casting alloys. Tables and graphs give compositions, mechanical properties, and aging effects. Corrosion resistance, brazability, machinability, dimensional stability, and castability are briefly mentioned.

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7234 Metallurgy and Mechanics of Hot Tearing. H. F. Bishop, C. G. Ackerlind, and W. S. Pellini. American Foundrymen's Society, Preprint 52-65, 1952, 14 pages. (TS200 Am35t)

Solidification conditions during hot tearing of steel castings were determined by simultaneous radiography and thermal analysis. Corollary strength tests coupled with thermal analysis showed that development of high strength followed immediately upon elimination of film regions. Variables such as C, P, S and pouring temperature were investigated. A new generalized theory is presented. 16 ref.

7235 Influence of Aluminum on Properties of Cast Gun Metal and Removal of Aluminum by Slag. Ake V. Larsson. American Foundrymen's Society, Preprint 52-70, 1952, 8 pages. (TS200 Am35t)

Influence of Al on the strength and pressure tightness of 83-6-5-6 gunmental was examined. Different refining agents were tested for removal of Al from brass and gunmetal melts. Practical recommendations are given. Tables and graphs.

7236 Determination of Plate Compressive Strengths at Elevated Temperatures. George J. Heimerl and William M. Roberts. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 251-256. (Technical Report 960.) (TL521 Un3r)

Results of local-instability tests of H-section plate assemblies and compressive stress-strain tests of extruded 75S-T6 Al alloy, obtained to determine flat-plate compressive strengths under stabilized elevated-temperature conditions, are given for temperatures up to 600°F. They show that methods available for calculating critical compressive stress at room temperature can also be used at elevated temperatures if the applicable compressive stress-strain curve for the material is given.

7237 Elastic and Plastic Buckling of Simply Supported Solid-Core Sandwich Plates in Compression. Paul Seide and Elbridge Z. Stowell. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 357-366. (Technical Report 967.) (TL521 Un3r)

A solution is presented for the above problem. Charts are presented for plates having face materials of 24S-T3 Al alloy, 75S-T6 Alclad Al alloy, and stainless steel. Comparison of computed and experimental buckling stresses.

7238 Fundamental Effects of Aging on Creep Properties of Solution-Treated Low-Carbon N-155 Alloy. D. N. Frey, J. W. Freeman, and A. E. White. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 939-968. (Technical Aeport 1001.) (TL521 Un3r)

Method for investigating fundamental mechanisms by which processing, heat treatment, and chemical composition control the properties of alloys at high temperatures. This method uses metallographic examination—both optical and electronic, studies of X-ray diffraction-line widths, intensities, and lattice parameters; and hardness surveys. Mechanical properties at high temperatures are then measured and correlated with structural conditions. Application to above alloy is described. 13 ref.

7239 Hydrogen Embrittlemnet of Steel; Review of the Literature. R. W. Buzzard and H. E. Cleaves. National Bureau of Standards, Circular 511, Sept. 24, 1951, 29 pages. (T21 Un3c)

Includes selected bibliography of about 1200 references.

See also:

6894 (tearing tendency of malleable iron)
6902 (mold materials vs properties of 85-5-5-5 and 81-3-7-9 alloys)
6911 (nonferrous hydraulic castings)
6922 (friction and wear in wire drawing)
6950 (wear resistance of carbide tools)
6953 (influence of stress on steel tools)
6957 (sintered aluminum for high temperatures)
6960 (creep and other properties of iron-powder parts)
6984 (properties of welds in 1.40%-Mn steel)
6986 (deposited metal from various electrodes)
7003 (mechanical properties of welds in steel castings)
7004 (tensile strength of steel chain)
7014 (strength of welded reinforcement of openings in structural steel)
7015 (matching properties of cast steel with weld metal)
7045 (flame-hardened steel pins and bolts)
7107 (influence of structure on hardness of steel)
7131 (Al deformation characteristics)
7135 (dislocation mechanism of twinning in Cd)
7140 (deformation of high-purity Al)
7252 (crack susceptibility of cast irons)
7456 (Al-alloy bearings)
7457 (creep resistance of high-temperature alloys)
7459 (Cu and Al)
7462 (metals for springs)
7464 (properties of Al pipe)
7466 (properties of carbon steel, stainless, and Al)
7469 (cast iron)
7560 (wear tests for diesel engines)
7598 (fatigue-testing machine for cermets)
7649 (wear and friction of bearings)
7933 (plastic and metal wings)
8165 (high-pressure effects on steel)

14. CORROSION

7240* Structure and Corrosion. (In Russian.) G. V. Akimov. *Izvestiia Akademii Nauk USSR*, Section of Chemical Sciences, Sept.-Oct. 1951, p. 469-480.

An experimental study was made of the corrosion of several metals and alloys by a variety of media. The structure of the metal and corrosion products were studied in relation to the rate and process of corrosion. Data are tabulated and charted.

7241* Kinetics of Dissolution of Aluminum in Sodium Hydroxide. (In Italian.) G. P. Bolognesi. *Alluminio*, v. 21, Jan. 1952, p. 27-41.

Above was studied by measurement of H_2 generated, for 99.5 and 99.9% Al, in different concentrations of NaOH, and in presence and absence of Hg. Solution potentials as a function of Hg content were also determined. Tables and graphs. 41 ref.

7242* Aluminum-Copper Clamps for Overhead Lines. (In German.) G. Dassetto. *Aluminum*, v. 28, Jan.-Feb. 1952, p. 31-32.

Galvanic corrosion occurs when Al and Cu come in contact, especially in the presence of moisture. Describes method of prevention in which a clamp of 99.5% Al is used as "material reserve", being attacked instead of the Al wire.

7243* Corrosion and Formation of a Negative Ferric Hydrate Sol. (In French.) M. O. Charmandarian and N. N. Andronikova. *Bulletin de la Société Chimique de France*, Jan.-Feb. 1952, p. 99-101.

Corrosion of iron, in the presence of gum arabic, in water and in soltuions of NaCl and Na_2SO_4, is accompanied by formation of the negative sol of ferric hydrate. Corrosion depends on amount of gum arabic, and on concentration of the solutions. Data are tabulated.

7244 Tantalum. Allan L. Percy. *Chemical Engineering*, v. 59, Apr. 1952, p. 259-260, 262-264.

Charts giving corrosion data on the above for a number of corrosives.

7245* The Theory of Overvoltage and Mechanism of the Attack of Metals in Solution out of Contact with Oxygen. (In French.) René Audubert. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 10, 1952, p. 1166-1168.

Discusses the above which makes it possible to specify whether dissolution is either direct or the result of a secondary reaction. Includes calculation.

7246* Mechanism of Corrosion by Oxygen. (In French.) René Audubert. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 31, 1952, p. 1448-1450.

The theory of overvoltage is applied to the corrosion of metals in the presence of oxygen, making it possible to explain the mechanism of the phenomenon.

7247 Some Factors in Anodic Processes on Corroding Metals. T. P. Hoar and U. R. Evans. *Journal of the Electrochemical Society*, v. 99, May 1952, p. 212-218.

It is suggested that the onset of aqueous corrosion is controlled

by the relative ease with which cations can pass through the original air-formed oxide film on the metal. A rapid supply of dissolved O_2 to all parts of the surface may arrest cations as they emerge, thus thickening the film and preventing corrosion; a far more rapid supply of O_2 is needed to prevent corrosion on Fe or Zn than on stainless steel, but the supply needed is diminshed if an inhibitor is present. 46 ref.

7248* Corrosion of Cast Iron With or Without Previous Oxidation by Liquid Zinc. (In French.) Paul Bastien and Pierre Azou. *Fonderie*, Mar. 1952, p. 2831-2845.

Discusses phenomena of corrosion by molten Zn, of cast iron not previously oxidized, and of cast iron previously oxidized by heating in air for 8 hrs. at 850°C. Tables, graphs, diagrams, and micrographs.

7249 Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry* v. 44, Apr. 1952, p. 89A-90A, 92A.

Data are summarized in chart form for corrosion of 6 materials—Pb, carbon steel, Durimet 20, Duriron, and two high-Ni alloys, by H_2SO_4 at temperatures up to boiling and concentrations from 0 to 100%.

7250 How Does Titanium Scale at High Temperatures? P. H. Morton and W. M. Baldwin, Jr. *Iron Age*, v. 169, May 1, 1952, p. 133-138.

Material from the U. S. Bureau of Mines was studied and results are reported in detail. Characteristics of this material and a summary of existing information on the scaling of Ti in O_2 or N_2 are given.

7251 Molten Sulphur; Corrosion of Steel at Temperatures Up to 450°C. *Iron and Steel*, v. 25, Apr. 1952, p. 137.

Deals with the mechanism and rate law for the corrosion of metals with the formation of sulfides. The progress of corrosion was recorded conductometrically. Weight-loss tests were made, and samples of the sulfide scale were examined by microscopic and X-ray methods.

7252 Tests on Heat-Resisting Cast Irons. M. M. Hallet. *Journal of the Iron and Steel Institute*, v. 170, Apr. 1952, p. 321-329.

Provides data for all usual heat-resisting cast irons, for selection of most suitable material for given conditions. Includes studies on resistance to scaling, and failure by cracking. Tables, graphs, and micrographs.

7253* Sodium Benzoate and Other Metal Benzoates as Corrosion-Inhibitors in Water and in Aqueous Solutions. F. Wormwell and A. D. Mercer. *Journal of Applied Chemistry*, v. 2, Mar. 1952, p. 150-160.

Sodium benzoate is shown to be an effective inhibitor of the corrosion of mild steel in distilled water, a moderately hard water, and very dilute NaCl solutions. Electrode-potential measurements and film-stripping experiments indicate that anodic inhibition produces and maintains a continuous film. Electron-diffraction examination of the stripped film has so far yielded definite evidence of γ-ferric oxide (or Fe_3O_4) only. 10 ref.

7254* The Cathodic Corrosion of Iron and the Anodic Formation of Crystallized Ferrite by Electrolysis of Molten Sodium Hydroxide. (In French.) M. Dodero. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, Feb. 1952, p. C210-C213; disc., C213.

Electrolysis of molten NaOH between 500 and 750°C., using iron electrodes under particular conditions of current density and distance bteween electrodes, was investigated. Cathodic corrosion and anodic formation of crystallized sodium ferrite were observed. Graphs and diagrams.

7255 The Dissolution of Metals Over the Temperature Range of 25 to −60°. II. The Dissolution of Cadmium in Hydrochloric Acid-Methyl Alcohol-Water Solutions. A. B. Garrett and J. R. Heiks. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 449-451.

Data were obtained for the above under static and dynamic conditions, in the presence and absence of a depolarizer over the temperature range of 25 to −60°C. Energy of activation of the static depolarized process is in the order of 4000 cal./mole and of the non-depolarized process is about 10,000 cal./mole. The non-depolarized dissolution process is first order with respect to the acid concentration. Graphs and tables.

7256 An Electron Diffraction Study of Films Formed by Sodium Nitrite Solution on Iron. M. Cohen. *Journal of Physical Chemistry*, v. 56, Apr. 15, 1952, p. 451-453.

Concerns the mechanism by which $NaNO_2$ inhibits corrosion of Fe. The passive film formed by $NaNO_2$ is γ-Fe_2O_3 with a small amount of γ-$Fe_2O_3.H_2O$. The oxide film is formed by a reaction between nitrite (and O_2) and metal at liquid-metal interface, with adsorption of inhibitor as a probable intermediate step. Tables.

7257* Influence of Phosphorus on the Oxidation of Iron at High Temperatures. (In Italian.) Nello Collari. *Metallurgia Italiana*, v. 44, Mar. 1952, p. 97-102.

Mechanism of the above was studied. It was found that the metalloid can develop a remarkable protective action, due to the formation of an iron-phosphate rich layer between the metal surface and the exterior oxidized layers. Shows that the layer of phosphate governs the oxidation phenomenon, reducing the diffusion activity of the iron. Micrographs and tables.

7258* Study of Some Electrochemical Phenomena by Means of an Electrical Weighing Device. (In Italian.) Paolo Spinedi. *Metallurgia Italiana*, v. 44, Mar. 1952, p. 109-116.

Passivation behavior of Ni, Sn, and Ag was studied. In the case of Ni it was found that variations in the exposed surface of the test bars examined result in a characteristic surface critical parameter curve. For Sn, the curves obtained show how the passivation process is influenced by the valence state in which the element dissloves in the etching medium under the action of an applied emf. As to Ag, according to the results obtained, it is anodically oxidized by a mechanism which leads to very slight modifications of the critical parameters.

7259* Chemical Changes on the Surface of Tin-Lead-Copper Alloys. (In German.) R. Strebinger and R. Niederhuemer. *Mittellungen des Chemischen Forschungsinstitutes der Wirtschaft Österreichs*, v. 6, Feb. 1952.

Discusses briefly chemical, microchemical, and microscopic studies of surface damage on the metal ornaments of stone coffins. Photomicrographs.

7260 Film-Rupture Mechanism of Stress Corrosion. Hugh L. Logan. *Journal of Research of the National Bureau of Standards*, v. 48, Feb. 1952, p. 99-105.

A study of the mechanism of stress corrosion. Films were removed by abrasion in an argon atmosphere from surfaces of an Al alloy, 2 brasses, a Mg alloy, and low-carbon steel. Stress corrosion is postulated to occur, in corrosive media, at stresses sufficient to rupture the protective film, by electrolytic action between the filmed (cathodic) and film-free (anodic areas). Graphs and charted data. 15 ref.

7261* New Light on How to Combat Corrosion in Water-Flood Operations. F. A. Prange. *Oil and Gas Journal*, v. 50, Apr. 14, 1952, p. 148, 150-152, 155.

Describes 3 clear-cut types of solutions to the problem of controlling this particular situation, and gives each a careful appraisal.

7262* Weld Decay in Stainless Steels. Marshall E. Parker. *Oil and Gas Journal*, v. 50, Apr. 21, 1952, p. 179.

A brief discussion of the above in reference to intergranular corrosion.

7263 How to Make Brass Liners Work. Wlliam C. Uhl. *Petroleum Processing*, v. 7, Apr. 1952, p. 475-477.

Brass linings are used to provide satisfactory corrosion resistance in lines and vessels carrying gasoline liquid and vapor. Sketches show some of the methods Sun Oil Co. worked out and applied in lining process lines, vessels, and fittings.

7264* Prevention of Corrosion of Ships in Sea Water. II. Cathodic Protection by Impressed Currents. K. N. Barnard. *Research*, v. 5, Apr. 1952, p. 176-180.

The advantages and disadvantages of impressed current systems are discussed.

7265 Trends in Gas Turbine Engine Materials. *SAE Journal*, v. 60, Apr. 1952, p. 58-63; disc., p. 63. (Excerpts from

14. *Corrosion*

Paper by R. H. Thielemann, J. C. Mertz, and W. P. Eddy, Jr.)
Presents results of a series of corrosion fatigue tests on 13 turbine-blade alloys. All are steels except one Ni-base and one Ti-base alloy.

7266 The Corrosion of 18/8 Stainless Steel in Acid Copper Sulphate. J. Bleton, J. Blanot, and P. Bastian. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 369-370. (A condensation.)
In view of variance in corrosion resistance of 2 metals of nearly identical composition, an investigation was made to determine correction. 91 melts were studied. Results are presented.

7267 Active State and Spontaneous Repassivation of Electrically Activated Iron in Nitric Acid. (In German.) Klaus J. Vetter. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Feb. 1952, p. 106-115.
Discussion is based on use of oscillography to determine minimum, maximum, and stationary potential in the active state; potential of the critical point at repassivation; and related times as functions of type of iron, HNO_3 concentration, HNO_3 concentration, persistent cathodic current density, stirring, temperature, and Fe-ion concentration. Tables and graphs. 45 ref.

7268* The Influence of Oxide Layers, as Well as of Chlorine Ions Upon the Electrochemical Behavior of Passive Iron, Chromium, and Iron-Chromium in Dilute Nitric Acid. (In German.) Theo Heumann and Wolfgang Rösener. *Zeitschrift für Metallkunde,* v. 43, Feb. 1952, p. 42-44.
Reports on tests with Cr and on an Fe alloy containing 20% Cr, as well as on alloys containing less Cr. Polarization curves are presented and stability of the oxide film is discussed. 10 ref.

7269* Oxidation of Magnesium and Its Alloys at Elevated Temperatures. (In Russian.) I. A. Makolkin. *Zhurnal Prikladnoi Khimii,* v. 24, May 1951, p. 460-470.
Surface oxidation of Mg, Al, Zn, and two Mg-Al alloys in air was investigated. The two alloys were also tested in N_2, CO_2, and SO_2. Equipment is illustrated; data are tabulated and charted.

7270* A Study of the Passivity of Stainless Steel. (In Russian.) G. P. Maitak and N. N. Gratsianskii. *Zhurnal Prikladneoi Khimii,* v. 24, May 1951, p. 545-547.
The electrode potentials of 18-8 specimens were measured in H_2SO_4 and $FeSO_4$-H_2SO_4 solutions. Data are tabulated.

7271 Corrosion of Metals by Hydrocarbon Solutions of Carboxylic Acids. (In Russian.) L. G. Gindin and V. A. Kazakova. *Zhurnal Prikladnoi Khimii,* v. 24, Sept. 1951, p. 958-969.
The corrosion of Mg, Fe, and Pb by various organic acids dissolved in hydrocarbons was investigated. Data are tabulated. 15 ref.

7272* Corrosion of Copper and Lead by Hydrocarbon Solutions of Iodine. (In Russian.) L. G. Gindin and M. V. Pavlova. *Zhurnal Prikladnoi Khimii,* v. 24, Oct. 1951, p. 1026-1032.
Results of laboratory investigation. Equipment is described and diagrammed; data are tabulated.

Miscellaneous Publications

7273 Prevention of Corrosion by Means Other Than Protective Coatings. F. L. Laque. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 227-234; disc., p. 240-244. (HC13 Un3p)
Control or modification of environments to which metals are exposed. This may involve reduction in humidity below certain critical limits, addition of specific chemicals which inhibit corrosion reactions, control of air supply, or control of flow of corrosives in contact with the metals. Cathodic protection, proper design, and addition of alloying elements are also discussed. 90 ref.

7274 Cost and Benefits of Conservation of Cast Iron and Steel Pipelines by Control of Corrosion. J. E. Carriere and C. A. Lobry De Bruyn. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 234-237, disc., p. 240-244. (HC13 Un3p)
Surveys soil conditions in the Netherlands. Data are presented on total length and value of existing water and gas mains in the Netherlands. The Dutch Corrosion Committee's specifications for pipe castings are described. Regarding testing of soils for corrosiveness, a chemical and physical examination procedure is outlined. Economic advantages of a high-grade protective coating over a cheap coal-tar dip are calculated.

See also:
6957 (sintered aluminum for high temperatures)
7011 (corrosion of rail ties)
7053 (bright dipping process)
7057 (resistance of red bronze plating)
7060 (technique for study of oxide films)
7095 (protection of metals)
7221 (corrosion resistance of carbides)
7232 (corrosion resistance of Zn alloys)
7233 (corrosion of Al casting alloys)
7460 (corrosion by liquid metals)
7463 (corrosion resistance of tinplate to food)
7464 (resistance of Al pipe)
7467 (corrosion-resistant steels in chemical engineering)
7560 (corrosion tests for diesel engines)
7649 (corrosion of bearings)
7650 (corrosion caused by lubricants)
7776 (anodic dissolution of Cu)
8294 (oxidation of lithographic plates)
8327 (corrosion costs and prevention)
8334 (corrosion-resistant alloy)

15. ANALYSIS—CHEMICAL AND PHYSICAL

7275 Chromatography of Methyl Stearate, Methyl Oleate, Methyl Linoleate and Methyl Linolenate: A Concept of Amplified Chromatographic Separations. Floyd E. Kurtz. *Journal of the American Chemical Society,* v. 74, Apr. 20, 1952, p. 1902-1909.
In a study on the above, more effective separations than previously reported for C_{18} esters were obtained. Discusses use of solutes of intermediate absorption affinities. Graphical and tabular data. 12 ref.

7276* Iodine Number Determinations by Dead-Stop Titrimetry. J. A. Duke and J. A. Maselli. *Journal of the American Oil Chemists' Society,* v. 29, Apr. 1952, p. 126-128.
Presents results of applying the dead-stop titration procedure to various methods for I_2 determination and comparing the results obtained, using a variety of fatty acids and oils which differ in their degrees of unsaturation.

7277* A Modified Micro-Diffusion Method for the Determination of Ethyl Alcohol in Blood. F. J. Scandrett. *Analyst,* v. 77, Mar. 1952, p. 132-135.
Describes a new micro-diffusion procedure that gives results in 30 minutes over the range of 80-300 μg. per 0.1 ml. of blood or urine with an accuracy of better than ±3%.

7278* Determination of Small Amounts of Cadmium in Lead by a One-Colour Dithizone Method. Louis Silverman and K. Trego. *Analyst,* v. 77, Mar. 1952, p. 143-148.
Describes procedure for the colorimetric determination of small amounts, 0.01–0.4%, of Cd in Pb or Pb alloys without prior removal of Pb. The common alloying elements do not interfere. For lower percentages of Cd, a portion of the Pb must be removed. Detailed alternative procedures are described and extensions of the method for samples containing more or less Cd are indicated.

7279* The Absorptiometric Determination of Thorium in Magnesium-Base Alloys by 1-(o-Arsonophenylazo)-2-Naphthol-3: 6-Disulphonic Acid. A. Mayer and G. Bradshaw. *Analyst,* v. 77, Mar. 1952, p. 154-158.
A red color is developed when the reagent is added to a Th solution. If Zr is present, Th is separated by precipitation as oxalate. None of the other elements normally present in Mg alloys interferes. The method gives results correct to within 2%, can be applied to samples with widely differing Th content

and is reasonably rapid. The preparation of the reagent is also described.

7280* Inhibiting Effect of Aluminum on the Masking of Barium by Vanadate Ions During Analysis. (In English) F. Burriel-Martí, J. Ramírez-Munoz, and E. Fernández-Caldas. *Analytica Chimica Acta*, v. 6, Mar. 1952, p. 197-207.

The adsorbing power of Al $(OH)_3$ for vanadate ions was used to avoid the masking of Ba ions resulting from the presence of vanadate ions in samples for qualitative analysis, where the vanadate ion hinders detection of Ba at the corresponding point during systematic analysis. Various experimental conditions were studied at different concentrations corresponding to ion concentrations of macro-, semimicro- and micro-analytical type. At lower concentrations, quantitative spectrographic techniques were applied, using the coprecipitation process.

7281* On the Iodometric Determination of the Bromide Ion. (In English) Zoltán G. Szabó and Lázló Csányi. *Analytica Chimica Acta*, v. 6, Mar. 1952, p. 208-216.

Oxidation of bromide by chlorine was investigated. Determination of Br ion can be carried out rapidly with an error of a few tenths of a per cent. 12 ref.

7282* Mercurimetric Determination of Chloride With Diphenylcarbazide Disodium Disulfonate as an Indicator. (In English.) James S. Parsons and John H. Yoe. *Analytica Chimica Acta*, v. 6, Mar. 1952, p. 217-225.

13 references.

7283* The Use of Naphthidine as Indicator in the Determination of Zinc in Metallurgical Analysis. (In English.) G. W. C. Milner. *Analytica Chimica Acta*, v. 6, Mar. 1952, p. 226-244.

Use of above reagent as internal indicator in titration of Zn with standard potassium ferrocyanide solutions is described. Suitable procedures are recommend for determination of Zn in various nonferrous alloys and in rubber ashes.

7284* Thermogravimetric Determination of Analytical Precipitates. (In French). **LX. Determination of Nitrogen Derivatives.** Clément Duval and Nguyen Dat Xuong. **LXI. Determination of Palladium.** Pierre Champ, Pierre Fauconnier, and Clément Duval. *Analytica Chimica Acta*, v. 6, Mar. 1952, p. 245-249.

In Part LX, thermolysis curves of various precipitates used for gravimetric estimation of azide, hyponitrite, nitrite, and nitrate ions were determined. Recommended reagents are indicated. In Part LXI, 19 compounds used in gravimetric determination of Pd were studied. 11 of them appear to be suitable, although more specific recommendations are given. 38 ref.

7285* New Analytical Reactions of Cobalt. Application to Analysis of Steels. (In French.) M. Jean. *Analytica Chimica Acta*, v. 6, Mar. 1952, p. 278-292.

Various reagents of the barbituric series, which give various color reactions with Co ions, were studied. Methods of synthesis of nitrobarbituric derivatives were investigated. Among the reagents studied, isonitroso-malonyl guanidine is proposed for colorimetric determination of Co in ferrous metals, especially in high-speed steels. Trilon B may be used in the spectrophotometric determination of Co in the same materials. 24 ref.

7286* Volumetric Determination of Iron(III), Vanadate, Dichromate, Iodate, Bromate, Ferricyanide Ions and Iodine. (In English.) *Analytica Chimica Acta*, v. 6, Apr. 1952, p. 293-315.

Describes generally applicable reductive method for substances having oxidation potentials exceeding 0.3 volt. Uses .01 N $SnCl_2$. Tables. 29 ref.

7287* The Alkalimetric Determination of Aluminium. (In English.) Michael Beck and Zoltan G. Szabo. *Analytica Chimica Acta*, v. 6, Apr. 1952, p. 316-321.

Evaluates published methods for determination of Al^{+3} and describes improved procedure. 14 ref.

7288* Trivalent Manganese As An Oxidimetric Reagent. (In English.) R. Belcher and T. S. West. *Analytica Chimica* Acta, v. 6, Apr. 1952, p. 322-332.

A study of the above, the manganic ion being stabilized with pyrophosphate. May be used for titration of ferrous iron, vanadium, nitrite, and arsenite.

7289* The Gravimetric Determination of Copper as Cuprous Thiocyanate. (In English.) R. Belcher and T. S. West. *Analytica Chimica Acta*, v. 6, Apr. 1952, p_2 337-339.

7290* Quantitative Separation of Traces of Lithium Contained in Calcium. (In French.) H. Hering. *Analytica Chimica Acta*, v. 6, Apr. 1952, p. 340-350.

Describes separation of 0.5γ Li^+ from a quantity of Ca^{+2} (up to 0.5 g.) by cation-exchange resins. 12 ref.

7291* Separation of Thorium and Lanthanum by Ion Exchange. (In French.) P. Radhakrishna. *Analytica Chimica Acta*, v. 6, Apr. 1952, p. 351-354.

Describes above. The separation is complete and the method can be applied to all rare-earth elements.

7292* Spectrophotometric Determination of Aluminum and Iron in Calcium. (In English.) Wilbur Sprain and Charles V. Banks. *Analytica Chimica Acta*, v. 6, Apr. 1952, p. 363-367.

A micro-method which avoids interference by Fe with Al. 14 ref.

7293* Spectrophotometric Determination of Vanadium Based on the Absorption Properties of the Blue Vanadyl Ion. (In English.) Rafael Santini, Jr., J. F. Hazel, and Wallace M. McNabb. *Analytica Chimica Acta*, v. 6, Apr. 1952, p. 368-372.

Useful in range 0.5-3.0 mg. vanadium per ml.

7294* Electrometric Titration of Chloride. An Improved Form of End-Point Half-Cell Containing a Hydrogen:Silver Exchange Resin. (In English.) R. R. Goodall and N. Mellor. *Analytica Chimica Acta*, v. 6, Apr. 1952, p. 373-378.

7295 Determination of Hydrocarbon Functional Groups by Infrared Spectroscopy. S. H. Hastings, A. T. Watson, R. B. Williams, and J. A. Anderson, Jr. *Analytical Chemistry*, v. 24, Apr. 1952, p. 612-618.

Infrared absorptivities of a number of pure paraffin, naphthene, and aromatic hydrocarbons were measured under carefully controlled conditions. This type of hydrocarbon characterization should find increasing application, especially as more complex hydrocarbons become available in a pure state.

7296 Quantitative Analysis With Infrared Spectrophotometers. Differential Analysis. David Z. Robinson. *Analytical Chemistry*, v. 24, Apr. 1952, p_2 619-622.

Discusses optimum conditions for quantitative analysis of 2-component solutions if both components absorb at the wave length at which the determination is made. Increasing the accuracy by changing the solutions in the beams is described.

7297 Infrared Spectra in Identification of Derivatives of Cyclopropane. Stephen E. Wiberley and Stanley C. Bunce. *Analytical Chemistry*, v. 24, Apr. 1952, p. 623-625.

A study of the infrared absorption spectra of 9 cyclopropyl derivatives.

7298 Infrared Determination of Chlorinated Hydrocarbon Vapors in Air. Paul F. Urone and Mary L. Druschel. *Analytical Chemistry*, v. 24, Apr. 1952, p. 626-630.

Air is sampled with a cooled scrubbing solvent, and qualitative and quantitative determinations of single or multiple-component vapor-air mixtures are made with an infrared spectrophotometer. A chart of the principal peaks of the spectra of 15 chlorinated hydrocarbons is presented, and methods of measuring recorded spectra and preparing standard curves are described. 58 ref.

7299 Infrared Absorption Spectra of Aluminum Soaps. Warren W. Harple, Stephen E. Wiberley, and Walter H. Bauer. *Analytical Chemistry*, v. 24, Apr. 1952, p. 635-638.

7300 Infrared Absorption Spectra of Tertiary Peroxides. A. R. Philpotts and William Thain. *Analytical Chemistry*, v. 24, Apr. 1952, p. 638-643.

Infrared spectra of tert-butyl, tert-amyl, and phenyl dimethyl methyl peroxides, hydroperoxides, and alcohols are compared. 13 ref.

15. *Analysis—Chemical and Physical*

7301 Investigation of Paper Chromatography; Factors That May Affect R_f Values in Paper Chromatography. George N. Kowkabany and Harold G. Cassidy. *Analytical Chemistry*, v. 24, Apr. 1952, p. 643-649.

Reports on a continuing investigation of the nature of the phenomena that operate in paper chromatography.

7302 Quantitative Analysis of Benzyl Alcohol. Turbidimetric Method Using Condensation Reaction. Max Kaufman. *Analytical Chemistry*, v. 24, Apr. 1952, p. 683-685.

7303 Method for Continuous Extraction With a Chelating Agent. W. Wayne Meinke and Richard E. Anderson. *Analytical Chemistry*, v. 24, Apr. 1952, p. 708-710.

A continuous method was developed safely extracting gram amounts of Th as the nitrate salt from Ac and Ra isotopes present in tracer quantities after cyclotron bombardment of Th. A benzene solution of thenoyl trifluoroacetone is used as the chelating agent. The method is readily adaptable to other types of extraction problems.

7304 Determination of Sulfur and Halogens; Improved Quartz Tube Combustion Apparatus. E. D. Peters, G. C. Rounds, and E. J. Agazzi. *Analytical Chemistry*, v. 24, Apr. 1952, p. 710-714.

7305 Separation of Sixteen Dinitrophenylamino Acids by Adsorption Chromatography on Silicic Acid—Celite. F. Charlotte Green and Lois M. Kay. *Analytical Chemistry*, v. 24, Apr. 1952, p. 726-732.

A systematic scheme is described for separation and identification of the above. A thorough investigation was made of conditions necessary for obtaining reproducible results. The scheme was then tested on 12 batches of silicic acid from several sources; 9 batches were entirely satisfactory without special treatment. Applicable to a wide variety of commercially available samples of silicic acid.

7306 Detection and Determination of 1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-Tetrahydro-4,7-Methanoindene. Percy B. Polen and Paul Silverman. *Analytical Chemistry*, v. 24, Apr. 1952, p. 733-735.

Describes a sensitive and selective means for evaluating trace residues of the above insecticide on food crops.

7307 Microestimation of Sulfur in Plant Materials, Soils, and Irrigation Waters. C. M. Johnson and Hideo Nishita. *Analytical Chemistry*, v. 24, Apr. 1952, p. 736-742.

The method permits rapid determination of sulfate S or total S in samples containing as little as 1 μg. of S. It should prove of value in studies of S metabolism in plant and animal biochemistry and physiology.

7308 Ash Residues From Petroleum Catalytic Cracking Feed Stocks; Spectrochemical Analysis. E. J. Gunn and J. M. Powers. *Analytical Chemistry*, v. 24, Apr. 1952, p. 742-746.

To evaluate the influence of trace metals on the refining, processing, and utilization of petroleum, a sensitive and rapid method requiring a minimum of effort was developed for measurement of trace metals in oils in concentrations of 0.1 to 10 ppm.

7309 m-Cresoxyacetic Acid as a Reagent For Thorium; Separation of Thorium From the Rare Earths of Monazite and From Uranium. M. Venkatarahaniah, B.S. V. Raghava Rao, and C. Lakshmana Rao. *Analytical Chemistry*, v. 24, Apr. 1952, p. 747-749.

7310* Extension of the Kjeldahl Process to a Generally Applicable Method for Determination of Nitrogen. (In German.) F. Zinneke. *Angewandte Chemie*, v. 64, Apr. 21, 1952, p. 220-222.

The substance containing nitrogen is decomposed with concentrated H_2SO_4 in a special apparatus by means of heat and action of a catalyst. The elementary nitrogen which escapes is measured directly. The decomposition products are treated further in the customary manner. The sum of both values is the overall N content. In the newly developed gas-volumetric method, the entire N content is obtained in the form of a gas and so determined.

7311* Volumetric Determination of Fluorine With a Zirconium Chloride Solution. Second Report. (In German.) H. v. Zeppelin. *Angewandte Chemie*, v. 64, Apr. 21, 1952, p. 223-224.

7312* Determination of Vitamin E in Blood Serum. (In Russion.) S. A. Kibardin. *Biokhimiia*, v. 16, Nov.-Dec. 1951, p. 511-514.

Gives details of colorimetric method.

7313* Direct Method of Determining the Acid-Alkaline Relations in Blood Serum. (In Russian.) Ia. A. Epshtein. *Biokhimiia*, v. 16, Nov.-Dec. 1951, p. 572-578.

Method for the above. Experimental data are charted and discussed. 25 ref.

7314* Determination of Ascorbic Acid by Chromatographic Methods in Plant Fluids. (In Russion.) E. F. Shomrai, E. A. Gavrilova, and V. V. Kravchenko. *Biokhimiia*, v. 16, Nov.-Dec. 1951, p. 604-610.

Apparatus and method for above analysis. Tables and illustrations. Typical data.

7315 The Analytical Chemistry of Potassium. Part II. The Use of Organic Reagents. Part III. Physical Methods. J. W. Robinson. *Chemical Age*, v. 66, Apr. 5, 1952, p. 507-510; Apr. 19, 1952, p. 573-577.

91 references.

7316* The Riehm-Lange Flame Photometer. (In German.) J. Fischer. *Chemie-Ingenieur-Technik*, v. 24, Mar. 1952, p. 24, Mar. 1952, p. 146-148.

Above apparatus for the flame, photometric determination of the alkali metals, particularly of Li, is described critically. Errors due to the basic substance, accompanying elements, and solvents are examined. Details of the most suitable procedure, reproducibility, accuracy, and speed of the method are given.

7317* An Apparatus for the Rapid Transformation of Photometer Curves Into Characteristic Film Curves. (In German.) Hermann Janeschitz-Kriegl. *Chemie-Ingenieur-Technik*, v. 24, Mar. 1952, p. 158-159.

Describes and diagrams the above. Characteristic curves are shown.

7318* Thermolysis of Cadmium Oxalate. (In French.) Paul Hagenmuller. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 10, 1952, p. 1168-1170.

Investigation of the above indicates possibility of its use for quantitative determination of Cd.

7319* Utilization of Relative Intensities of Infrared Adsorption Bands For Interpretation of Spectra. (In French.) Marcel Larnaudie. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 31, 1952, p. 1440-1443.

Outlines above method, giving mathematical interpretation. Its application to cyclohexane is described.

7320 Use of Powder Metallurgy Techniques Mean Faster Preparation of Spectrochemical Standards. Walter O. Gerber, Jr. *General Electric Review*, v. 55, May 1952, p. 58-60.

Recommended for its flexibility and for new compositions hard to analyze, including Al-containing alloy steel, and stainless iron.

7321 Development and Contemporary State of Spectrographic Analysis in the USSR. (In Czech.) Adolf Pokerny. *Hutnické Listy*, v. 7, Feb. 1952, p. 62-64.

Presents a brief outline of the above.

7322* Spectrographic Determination of Magnesium in Modified Cast Iron. (In Czech.) I. Ruzicka and Z. Zika. *Hutnické Listy*, v. 7, Feb. 1952, p. 64-67.

A precision within 1-4% of the total Mg content was obtained. Results are compared with those of chemical analyses.

7323 Determination of Vanadium in Ferro-Vanadium. *Journal of the Iron and Steel Institute*, v. 170, Apr. 1952, p. 343-347.

Discussion and recommended volumetric method. (By methods of Analysis Committee, Metallurgy Div., BISRA.)

7324* Isolation of Amino Acids by Chromatography on Ion Exchange Columns; Use of Volatile Buffers. C.H.W. Hirs, Stanford Moore, and William H. Stein. *Journal of Biological Chemistry*, v. 195, Apr. 1952, p. 669-683.

Deals with above for 50-300 mg. quantities of components of a mixture. In application, acids were obtained in analytically pure form in an average yield of 66%. Apparatus diagram and tables. 28 ref.

7325 Logarithmic Diagrams in Trace Analysis. J. Gillis. *Journal of Chemical Education*, v. 29, Apr. 1952, p. 170-176.

7326* The Analysis of Chlorinated Organic Insecticides by Partition Chromatography on Paper and on Cellulose Columns. Proinsias O'Colla. *Journal of the Science of Food and Agriculture*, v. 3, Mar. 1952, p. 130-135.

35 references.

7327 A Modified "Thermal Conductivity" Gas Analyser for Measuring Methane in Air or Carbon Dioxide. F. W. Pritchard. *Journal of Scientific Instruments*, v. 29, Apr. 1952, p. 116-117.

7328* Chemical Analysis of Light Metals and Alloys. II. Sec. 1. The Analysis of Aluminium and Its Alloys. S. T. Payne. *Light Metals*, v. 15, Apr. 1952, p. 127-128.

(To be continued.)

7329* The Practical Possibilities of Ion Exchange. Part 2. Ion Exchangers in Chemical Analysis. T.R.E. Kressman. *Manufacturing Chemist and Manufacturing Perfumer*, v. 23, Apr. 1952, p. 149-151, 160.

A survey covering analytical uses in many fields, including insecticides, pharmaceuticals, and complex ions. 46 ref. (To be continued.)

7330* The Analysis of Chromium Plating Baths Containing Fluorides and Fluosilicates. H.A. van Oosterhout and E.J.C. van de Velde. *Metal Finishing*, v. 50, Apr. 1952, p. 60-63, 69.

Two analytical methods are discussed and results compared. The distillation method is preferred. Tables and apparatus diagram. 18 ref.

7331 Investigations on Colorimetric Methods of Metallurgical Analysis. Part V. Details of Duplicate Colour Standards for the Determination of Molybdenum in Alloy Steels. G.V.L.N. Murty and S. Jaya Rao. *Metallurgia*, v. 45, Apr. 1952, p. 212-213.

7332 Chemical and Crystallographic Analysis With Electron Beams. *Metal Progress*, v. 61, May 1952, p. 182, 184. (Translated and condensed from "Application of Electron Beams to a Point-to-Point Chemical and Crystallographic Analysis", R. Castaing, *Recherche Aeronautique*, v. 23, 1951, p. 41-50.)

Describes procedure for above using an electrostatic-type electron microscope. Emission of characteristic x-rays permit point-to-point chemical analysis. Metallurgical applications include establishment of intermetallic diffusion curves, investigation of local variations in concentration with alloys; and especially, analysis of segregations, precipitates, or inclusions of unknown or less known nature. Possibilities exist for crystallographic analysis using a monocrystalline anode.

7333 Metallurgical Micro-Analysis. E. C. Pigott. *Metal Treatment and Drop Forging*, v. 19, Apr. 1952, p. 147-154.

Development of microchemical techniques and apparatus during recent years with special reference to equipping a laboratory. 19 ref.

7334* Microtitration With Ethylenediamine Tetra-Acetic Acid. II. Determination of Small Amounts of Phosphate. (In German.) H. Flaschka and A. Holasek. *Mikrochemie vereinigt mit Mikrochimica Acta*, v. 39, no. 1, 1952, p. 101-104.

7335 A Rapid Semi-Quantitative Spot Test for Reducing Steroids. *Nature*, v. 169, Mar. 22, 1952, p. 506-507.

7336 Solvent Extraction of Indium. *Nature*, v. 169, Apr. 12, 1952, p. 619-620.

The separation and determination of small amounts of indium in the presence of other metals.

7337 The Analysis of Organic Pigments. K. G. Hargreaves. *Journal of the Oil & Colour Chemists' Association*, v. 35, Apr. 1952, p. 139-160; disc., p. 160-161.

The identification of organic pigments by chemical means is considered. Pigments are classified into 4 main groups and their differentiation described. The determination of the nature of any substratum or laking metal is described, and tables are given displaying spot tests for rapid identification of the colors most frequently used in commerce. A brief indication is given of methods useful for dealing with mixtures of pigments.

7338* The Spectrophotometric Determination of Molybdenum in Molybdenum Steels. (In English.) P. Karsten and J. H. C. Van Mourik. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Feb., 1952, p. 302-308.

The existing Mo determination with thiocyanate is put on a firmer basis. The recommended procedure is adapted to it and applied to Mo steels.

7339* An Improved Method for the Determination of 2, 4-D Acid (2,4-Dichlorophenoxy Acetic Acid) and of M.C.P.A. (2-Methyl-4-Chlorophenoxy Acetic Acid) in Herbicidal Formulations. (In English.) J. A. A. Ketelaar and H. R. Gersmann. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Apr. 1952, p. 497-500.

7240* A New Method for Aromatic-Ring Determination in Oils. (In French.) L. Robert. *Revue de l'Institut Français du Petrole et Annales des Combustibles Liquides*, v. 7, Mar. 1952, p. 55-61

Describes method using refractive index, density, and anilinepoint determinations. It seems to have the same precision as the Waterman and related methods. Its great advantage is that it does not require determination of molecular weight.

7341* Use of Stigmatic Spectrography in Metallurgical Analysis. (In French.) Pierre-Jean Bouchet. *Revue de Métallurgie*, v. 49, Mar. 1952, p. 177-184.

Use of an intermittent arc obtained with a continuous current of 220 volts, also influence of composition of the electrodes, were studied. Application to the analysis of massive electrodes and powdered specimens is discussed. Includes schematic diagrams, graphs, and spectrograms. 10 ref.

7342* Contribution to the Determination of Nitrogen in Certain Alloy Steels and Ferro-Alloys. (In French.) P. Rocquet and M. Olette. *Revue de Métallurgie*, v. 49, Mar. 1952, p. 221-230.

Describes a method which makes it possible to determine by acid attack the N content in steel or ferroalloys containing elements which form refractory nitrides. Diagrams, photographs, and tables.

7343 Quantitative Determination of Copper in Natural Rubber. Lewis T. Milliken. *Rubber Age*, v. 71, Apr. 1952, p. 64-66.

A procedure is recommended in which small amounts of copper in rubber can be measured quantitatively by determining the depth of color of a copper-carbamate complex in a CCl_4 solution. 19 ref.

7344* M. S. Tswett's Chromatographic Method of Analysis. (In Russian.) Z. V. Zhidkova. *Uspekhi Fizicheskikh Nauk*, v. 44, July 1951, p. 369-392.

A review. Graphs, diagrams, and colored illustrations. 46 ref.

7345* Determination of Small Amounts of Bismuth in Lead With the Aid of Cupferron. (In German.) Helmut Bode and Günther Henrich. *Zeitschrift für analytische Chemie*, v. 135, no. 2, 1952, p. 68-106.

Describes method of separating Bi from Pb by extracting the Bi cupferronate with chloroform. Tables. 17 ref.

7346* Oxygen Determination in Lead (In German.) Klaus Barteld and Wilhelm Hofmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 5, Mar. 1952, p. 102-105.

Describes and diagrams an apparatus for determining O_2 in Pb by the manometric H_2-reduction method. Data are graphed and tabulated. 10 ref.

7347* Mathematical-Statistical Principles of Sampling and Assaying of Ores, Metals, and Residues. (In German.)

15. *Analysis—Chemical and Physical*

Ulrich Graf and Hans-Joachim Henning. *Zeitschrift für Erzbergbau and Metallhüttenwesen*, v. 5, Apr. 1952, p. 127-131.

7348* Determining Fluorine in Ores and Slags. (In German.) Ernst Eberius and Werner Kowalski. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 5, Apr. 1952, p. 131-136.

Quantitative photometric and titrimetric perchloric acid procedure accurate to 0.05γ per ml. Typical data. 10 ref.

7349* Determining Small Lead Contents in Chromium Oxide and Metallic Chromium. (In German.) Bernhard Rodewald. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 5, Apr. 1952, p. 136-138.

Three methods for the above; their ranges, accuracy, advantages, and disadvantages.

7350* Photometric Determination of Titanium (In German.) Max Zimmerman. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 5, Apr. 1952, p. 148-149.

Evaluation of suitability of chromatropic acid for above, disturbing effects of Mo and V, and procedure for determining Ti. Tables.

7351* Photometric Determination of Alloying Components and Impurities in Aluminum and Aluminum Alloys. (In German.) M. Bednara. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 5, Apr. 1952, p. 149-152.

Describes use of the Pulfrich photometer and suitable light filters for determination of Cu, Fe, Si, Ti, Mn, and Bi in Al and Zn. Tables and graphs.

7352* Properties of Acids and Bases in Acid Solutions. III. Titration of Weak Bases in Non-Aqueous Formic Acid. (In Russion.) A. M. Shkodin, N. A. Izmailov, and N. P. Dziuba. *Zhurnal Analiticheskoi Khimii*, v. 6, Sept.-Oct. 1951, p. 273-275.

Data are tabulated and charted.

7353* Report on a New Sensitive Mangesium Reaction. (In Russian.) Kh. N. Pochinok and V. Ia. Pochinok. *Zhurnal Analiticheskoi Khimii*, v. 6, Sept.-Oct. 1951, p. 288-296.

An investigation was made of the use 3-phenyl-l-p-nitro-phenyl-3-oxytriazene in determination of Mg in plant ash and natural waters. Procedures are described; chemical reaction data are tabulated and charted.

7354* Method of Concentration During the Determination of Traces of Nickel. III. Determination of Ni in Mixtures of Cations of the Third Analytical Group. (In Russian.) V. T. Chuiko. *Zhurnal Analiticheskoi Khimii*, v. 6, Sept.-Oct. 1951, p. 297-299.

The use of repeated co-precipitation of Ni (or similar metal) with a collecting agent was investigated. Results are discussed and tabulated.

7355* Acidimetric Determination of Tin by the Use of Sodium Vinylate. (In Russian.) V. K. Zolotukhin. *Zhurnal Analiticheskoi Khimii*, v. 6, Sept.-Oct. 1951, p. 300-302.

The reactions used in the above analysis are discussed. Experimental data are tabulated.

7356* Salicylalamine in Analysis. III. Physicochemical and Analytical Parameters of a Series of Homologues of Salicylalalkylamine. (In Russian.) A. P. Terent'ev and E. G. Rukhadze. *Zhurnal Analiticheskoi Khimii*, v. 6, Sept.-Oct. 1951, p. 303-307.

Quantitative analysis of Cu and Ni using the above reagents was investigated. Data are discussed, tabulated, and charted.

7357* Alkaline Hydrolysis of Thiazolidines and Its Analytical Applications. (In Russian.) N. M. Turkevich and M. P. Makukha. *Zhurnal Analiticheskoi Khimii*, v. 6, Sept.-Oct. 1951, p. 308-316.

The alkaline hydrolysis of 71 sulfur-containing compounds was investigated as to their analytical applications. Data are discussed and tabulated.

7358* Quantitative Determination of Carbon and Hydrogen in Nitrogen-Containing Organic Materials in the Presence of Surface-Combustion Catalysts. II. (In Russian.) P. N. Fedoseev and M. M. Pavlenko. *Zhurnal Analiticheskoi Khimii*, v. 6, Sept.-Oct. 1951, p. 317-320.

By the above method, carbon content can be determined within ±0.3% and hydrogen within ±0.2%. Apparatus is illustrated and experimental data are tabulated.

7359* Determination of Metallic Poisons in Samples of Biological Origin. I. (In Russian.) I. G. Druzhinin and P. S. Kislitsyn. *Zhurnal Analiticheskoi Khimii*, v. 6, Sept.-Oct. 1951, p. 321-324.

An electrolytic method for the above is described. Experimental data are tabulated and charted. 12 ref.

7360* The Use of Nicotinthiocyanate Reagents in Inorganic Analysis. (In Russian.) S. E. Burkat, E. N. Skrynnik, and S. S. Iaroslavskaia. *Zhurnal Analiticheskoi Khimii*, v. 6, Sept. Oct. 1951, p. 325-327.

Experiments showed that nicotine, in the presence of ammonium thiocyanate, can be used in the microchemical qualitative determination of Cu^{++}, Cd^{++}, Ni^{++}, and Fe^{++}. Data are tabulated.

7361 Spectrochemistry of the Metalloids: F, Cl, Br, I, S, and Se. A. Gatterer. Battelle Translation. (From *Spectrochemica Acta*, v. 3, 1947-1949, p. 214-232.)

An easy and rapid method for qualitative and quantitative spectrographic determination of the above. Apparatus diagrams and illustrations. Spectrograms.

7362 Emission Spectroscopy of Organic Substances, Using Electron Impulse Excitation in a Glow Discharge. I. H. Schüler. Batelle Translation. (From *Spectrochimica Acta*, v. 4, 1950, p. 85-92.)

By using a new type of discharge tube, in which the positive column is held at low temperatures and has low excitation currents, the spectra of organic molecules may be observed, instead of the usual glow-discharge spectrum of molecular fragments. Differences and similarities in the emission and absorption spectra of various benzene derivatives are discussed and spectra of organic compounds with one ring are described.

7363 Determination of Columbium in Tungsten-Free High Alloys. R. B. Bolubtsova. Henry Brutcher, Translation No. 2827, 8 pages. (From *Zhurnal Analiticheskoi Khimii*, v. 6, Jan.-Feb. 1951, p. 34-38.)

Previously abstracted from the original.

Books

7364 A Text-Book of Quantitative Inorganic Analysis; Theory and Practice. Ed. 2. Arthur I. Voegl. 918 pages. 1951. Longmans, Green and Co., New York. (QD101 V86t2)

This comprehensive reference work replaces the 1939 edition. It includes numerous major revisions.

See also:
7767 (separation of Fe, Ni, Co, and Cu group)
7877 (liquid-phase chromatography of organic compounds)
7895 (olefin identification)

16. APPARATUS, METHODS, AND STANDARDS

7365* Ultrasonic Flaw-Detector; Details of Recent Developments in the Echo Method of Flaw-Detection. *Aircraft Production*, v. 14, Apr. 1952, p. 126-129.

7366* Roundness Measurement. *Aircraft Production*, v. 14, May 1952, p. 151-153.

Describes a high-precision, recording, production-type instrument for above called the Talyrond. Radial magnification range is 200-10,000 and one division of 0.1 in. on the radial coordinate can represent an error range from 0.0005 to 0.000025 in. Photographs and specimen charts.

7367* Photoactive Coefficients of Gamma- and X-Rays. (In Italian.) W. Ruff. *Alluminio*, v. 21, Jan. 1952, p. 7-14.

Factors affecting the quality of photographic images obtained by use of above types of radiation. Instead of the method based on thickness differences, it is suggested that photometric methods be used to determine blackening differences as a function of thickness. Applicable to nondestructive testing. Tables, graphs, and illustrations. 10 ref.

7368 Precision Actinometry at Low Light Intensities With Malachite Green Leucocyanide. Jack G. Calvert and Henry J. L. Rechen. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2101-2103.

Confirms accuracy and utility of above method for quantitative ultraviolet measurements of the order of 10^{12} quanta per sec. Presents an improvement in preparation and purification of malachite green leucocyanide. Tables.

7369 Conductivity Crystal Counters. A. G. Chynoweth. *American Journal of Physics*, v. 20, Apr. 1952, p. 218-226.

Reviews properties and basic principles of known types of above. Discusses problems to be solved before these counters can be of practical use. 37 ref.

7370* Monochromator Utilizing the Rotary Power of Quartz. C. S. Hurlbut, Jr. and John L. Rosenfeld. *American Mineralogist*, v. 27, Mar.-Apr. 1952, p. 158-165.

The Emmons method of double variation is a powerful means of accurately determining the refractive index of small crystal fragments. However, even with the carbon arc as a light source, the intensity of light issuing from the average monochromator is so low that prolonged work is a strain on the eyes. Development of the quartz monochromator described was undertaken in the hope of obtaining an instrument that would give more adequate illumination for the Emmons method. Limited use to date has given most satisfactory results.

7371* Microwave Spectroscopy. C. H. Townes. *American Scientist*, v. 40, Apr. 1952, p. 270-290.

A survey of the above field for the nonspecialist. Includes historical development, components involved, uses, and limitations. 16 ref.

7372 Estimation of Composition of Ancient Metal Objects. Utility of Specific Gravity Measurements. Earle R. Caley. *Analytical Chemistry*, v. 24, Apr. 1952, p. 676-681.

Discusses critically the validity and utility of specific gravity measurements as a means of estimating the above. 18 ref.

7373* Processes and Instruments for Measuring Very Low Gas Pressures. III. Friction Manometer and Vacuum Meter Based on the Radiometer Principle. (In German.) Helmut Schwarz. *Archiv für technisches Messen*, Mar. 1952, p. 53-56.

93 references.

7374* Heat-Transfer and Heat-Flow Meter. (In German.) Gerhard Eichert. *Archiv für technisches Messen*, Mar. 1952, p. 57-60.

Above combines the principles of the water colorimeter and of the thermopile. Diagrams and graphs. 15 ref.

7375* Geiger Counter Developments. *Atomics*, v. 3, Apr. 1952, p. 97-103.

Discusses problems and trends in the design, manufacture and use of these counters. 26 ref.

7376* An Efficient Ketene Generator for the Laboratory. (In German.) Günter Quadbeck. *Chemie-Ingenieur-Technik*, v. 24, Apr. 1952, p. 210-211.

7377* A Modified 100 Cc. Othmer Equilibrium Still. S.R.M. Ellis. *Chemical & Process Engineering*, v. 33, Apr. 1952, p. 190-191.

Describes and illustrates above for obtaining accurate equilibrium data on binary mixtures with a small difference in boiling point.

7378* P.R. Copper Plating. *Electroplating and Metal Finishing* v. 5, Apr. 1952, p. 119-120.

New Westinghouse patents are reviewed.

7379* Draft British Standard for Sprayed Metal Coatings. *Electroplating and Metal Finishing*, v. 5, Apr. 1952, p. 133, 135-136, 138.

A summary and commentary on the above resulting from work by a committee of the British Standards Institution.

7380* The Development of Engineering Metrology. F. H. Holt. *Engineer*, v. 193, Mar. 21, 1952, p. 448-450; Apr. 4, 1952, p. 480-483.

An extensive survey of procedures and equipment. Illustrated.

7381 Accurate Measurement of the Dielectric Constants of Solutions. A. V. Few, J. W. Smith, and L. B. Witten. *Transactions of the Faraday Society*, v. 48, Mar. 1952, p. 211-215.

The accuracy required in dielectric-constant measurements to be used for the evaluation of apparent dipole moments in solution is discussed critically. Two forms of apparatus which meet the requirements of being capable of yielding relative measurements of dielectric constants accurate to within ±0.0001 over the range 1.0—3.5 units are described.

7382 Universal High-Speed Digital Computers: Serial Computing Circuits. F. C. Williams, A. A. Robinson, and T. Kilburn. *Proceedings of the Institution of Electrical Engineers*, v. 99, pt. 2, Apr. 1952, p. 107-120; disc., p. 120-123.

Discusses circuits for use with numbers expressed in serial binary form. Special reference made to a machine in which the storage of binary numbers is achieved by the use of charge-patterns on the screens of cathode-ray tubes.

7383 Universal High-Speed Digital Computers: A Magnetic Store. F. C. Williams, T. Kilburn, and G. E. Thomas. *Proceedings of the Institution of Electrical Engineers*, v. 99, pt. 2, Apr. 1952, p. 94-106; disc., p. 120-123.

The element and organization of an experimental magnetic storage system are described.

7384 A System Utilizing Coarse and Fine Position-Measuring Elements Simultaneously in Remote-Position-Control Servo Mechanisms. J. C. West. *Proceedings of the Institution of Electrical Engineers*, v. 99, pt. 2, Apr. 1952, p. 135-141; disc., p. 142-143.

A system is described where both the coarse and the fine measuring elements normally employed in a high-precision position-control servomechanism can be used simultaneously without the need for switching from coarse to fine. The steady-state accuracy of the whole mechanism is the same as that of a conventional coarse-fine changeover system.

7385 Instrument Electronics. Milton H. Aronson. *Instruments*, v. 25, Apr. 1952, p. 460-461, 498, 500, 502, 504, 506, 508-509.

Covers video amplifiers, bias methods, feedback, cathode followers, electrometer tubes, and noise level.

7386 An A-C Induction Flow Meter. W. G. James. *Instruments*, v. 25, Apr. 1952, p. 473-478.

Presents results of a thorough investigation of above. 28 ref.

7387 Dynamics of Pulsative Flow Through Orifices. Raymond C. Baird, and Ira C. Bechtold. *Instruments*, v. 25, Apr. 1952, p. 481-486.

Introduces electrical analogies into the orifice-metering problem, coupled with a sample of field and laboratory experimental data with the suggestion that the concept of analogies be used to help analyze the orifice-metering problem as caused by pulsative flow. The general theory evolved from this approach is qualitatively substantiated by means of both field and laboratory experimental data.

7388* A Sampling Analogue Computer. John Broomall and Leon Riebman. *Proceedings of the I.R.E.*, v. 40, May 1952, p. 568-572.

The sampling analogue computer described may be used for various algebraic operations. Using standard electronic components, and with electrical inputs, only 15 tubes are required to produce an output accuracy better than 1% of full scale.

7389 Metallurgical Applications of X-Ray Fluorescent Analysis. P.K. Koh and Betty Caugherty. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 427-433.

Describes techniques for above using a Geiger-counter goniometer. Considers influence of potential vaiations, specimen preparation, and thickness of diffracting crystal. Various measurements were made on a number of common commercially pure metallic elements; on constituents of Fe-Ni, Fe-Cr, and Fe-Ni-Cr alloys; and on several steels. Tables and graphs.

7390* Application of the Electron Microscope to Measurement of Specific Surfaces. Determination of the Effectiveness of Grinding. (In French.) René Bernard, Émile Pernoux, and Stanislas Teichner. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, Mar. 1952, p. 147-156.

16. *Apparatus, Methods, and Standards*

Factors influencing above measurements. Tables and graphs. 24 ref.

7391 Vibrating Micro-Electrodes in Polarography. The Relationship Between Diffusion Current and Frequency and Amplitude of Vibration. A. J. Lindsey. *Journal of Physical Chemistry*, v. 56, Apr. 15, 1952, p. 439-442.

Presents a study of the above. Recommends that vibrating micro-electrodes be used with amplitude and frequency sufficient to ensure a constant average relative speed of about 25-30 cm. per sec. Apparatus employed for testing vibrating electrodes is described and a method of using them in polarography and amperometric titration is given. Graphs and apparatus diagrams. 10 ref.

7392 Variables in the Self-Absorption of Low-Energy Beta Particles. George K. Schweitzer and James W. Nehls. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 541-544.

A study of the above in reference to S-34 and Ca-45. Variations in atomic number of sample material, atomic number of the backing, sample-to-counting-tube-window distance, and counting-tube window thickness all have an appreciable effect upon the shape of the percent specific activity vs. surface density curve. Tables and graphs.

7393* Characteristics of a Thermocouple Anemometer. (In English.) Suekicki Kawata, Yoshiro Omori, and Koichi Nishimura. *Memoirs of the Faculty of Engineering* (Kyoto University), v. 14, Jan. 1952, p. 12-20.

Deals with construction, calibration, performance, and uses of the above. Apparatus diagrams and graphs.

7394 Nomograms Simplify Analysis of Servomechanisms. R. Hadekel. *Machine Design*, v. 24, May 1952, p. 165-169.

7395* The Pilot "Plus 3" Gauging System. F.W. M. Lee. *Machinery* (London), v. 80, Mar. 27, 1952, p. 531-537.

Describes in detail the above, a new system devised to provide tolerances suitable for modern engineering practice. Tables and graphs.

7396* A Sensitive Comparator For Measuring Wires. J. C. Evans, R. S. Marriner, and I. G. Morgan. *Machinery* (London), v. 80, Apr. 24, 1952, p. 735-739, 744.

Describes above suitable for laboratory measurement of variation in diameter of wires as small as 0.001 in. in diameter. It is a pneumatic type and can provide a continuous record. Apparatus diagrams.

7397* A New Ultrasonic Probing Apparatus. Its Practical Utilization. (In French.) J. Krautkrämer and H. Krautkrämer. *Métaux: Corrosion-Industries*, v. 27, Feb. 1952, p. 89-94.

Discusses the above apparatus, based on the impulse and reflection method. In the case of defects near the surface, minimum depth of defect necessary for a direct indication is lowered considerably. Even at 8 mm. depth, the echo is separated from the impulse. Measuring with precision the width of surfaces is possible on sheets 3 mm. wide. Includes photographs.

7398 Techniques For Growing and Mounting Small Single Crystals of Refractory Compounds. Fred Ordway. *Journal of Research of the National Bureau of Standards*, v. 48, Feb. 1952, p. 152-158.

An apparatus is described for growing single crystals in a small droplet of melt at temperatures up to 1600°C. The droplet, held by capillarity at the junction of a thermocouple, can be observed during the process through a binocular microscope. The heating is by means of a high-frequency current that can be separated by a filter from the thermocouple electromotive force, allowing the electromotive force to be measured continuously. The apparatus is therefore suitable also for determining melting points. The process of mounting and grinding the single-crystal specimens for X-ray diffraction, and a simple but versatile micromanipulator to facilitate these procedures, are described. 32 ref.

7399 A Method of Preparing Crystals That Undergo Changes Under Electron Bombardment in an Electron Microscope. *Nature*, v. 169, Mar. 22, 1952, p. 498-499.

7400 Study of the Distribution of Surface Potential by Means of Radioactive Deposits. T. Westermark and L. G. Erwall. *Nature*, v. 169, Apr. 26, 1952, p. 703-704.

Experiments on the contact potentials of polished metallic surfaces. A special camera of cylindrical form was constructed containing a radiothorium source. A uniform electric field can be maintained in the space between the source and a collecting disk. After exposure, the disk is removed and an autoradiograph prepared. The method has so far been applied only to a few alloys; but it is believed to be of rather general applicability, provided the contact-potential differences are not too small.

7401 Survey Methods for Slow Neutrons. Burton J. Moyer. *Nucleonics*, v. 10, Apr. 1952, p. 14-17.

Reviews 3 methods for measuring thermal and near-thermal neutrons in relation to evaluation of neutron hazard around accelerators and reactors. Circuit diagram. 10 ref.

7402* Relative Transmission of Beta Particles Through G-M Counter Windows. Chia-Hua Chang and C. Sharp Cook. *Nucleonics*, v. 10, Apr. 1952, p. 24-27.

Describes a method that uses a normal magnetic-lens spectrometer for testing electron-transmission characteristics of the window of a Geiger-Müller counter. Graphs.

7403* Fast Pulse Circuit Techniques for Scintillation Counters. F. H. Wells. *Nucleonics*, v. 10, Apr. 1952, p. 28-33.

Describes above and circuits for testing, calibration, and for displaying results. Block and circuit diagrams and graphs.

7404* Pulse Amplitude Analyzers for Spectrometry. G. G. Kelley. *Nucleonics*, v. 10, Apr. 1952, p. 34-37.

Discusses design of the above, chiefly considering a new 20-channel analyzer at Oak Ridge National Laboratory. Circuit diagrams.

7405* An Automatic Scanner for Paper Radiochromatograms. Sidney Soloway, Frank J. Rennis, and DeWitt Stetten, Jr. *Nucleonics*, v. 10, Apr. 1952, p. 52-53.

Describes above which offers rapid localization of radioactive materials along a unidimensional strip; permits ready estimation of R_f values and relative abundances of radioactive material; and provides permanent record of experiments. Block diagram.

7406* Radiation-Induced Decomposition of Certain Organic Molecules in Solution. Marilyn Grace Alder and Henry Eyring. *Nucleonics*, v. 10, Apr. 1952, p. 54-57.

A reaction mechanism is proposed for systematizing effects of radiation on a wide variety of systems in aqueous solutions. Applicability checked against experimental data on irradiation of aqueous and petroleum ether solutions with X- and cathode-rays and α-particles. Graphs. 25 ref.

7407* Production Testing of Multiplier Phototubes. R. W. Engstrom, R. G. Stoudenheimer, and A. M. Glover. *Nucleonics*, v. 10, Apr. 1952, p. 58-62.

Discusses design and production tests applied in the manufacture of RCA5819 tubes for reference of user in correlation with operating data. Graphs.

7408* Prevention of Side Effects in Sterilization of Foods and Drugs by Ionizing Radiations. B. E. Proctor and S. A. Goldblith. *Nucleonics*, v. 10, Apr. 1952, p. 64-65.

Brief discussion of above covering some aqueous reactions and use of additives in prevention of off-flavor of food and of red-blood-cell hemolysis. Graphs.

7409 Notes on the Practice of Infrared Spectroscopy. R. C. Lord, R. S. McDonald, and Foil A. Miller. *Journal of the Optical Society of America*, v. 42, Mar. 1952, p. 149-159.

Miscellaneous techniques for infrared prism spectroscopy are described in detail. A modified source-optical system and a method of calibration adjustment for Perkin-Elmer Model 12 instruments are also discussed. Diagrams. 35 ref.

7410 Scattering of Visible and Near Infrared Radiation by Layered Distributions of Small Metal Spheres. E. Lynn Cleveland and Richard C. Raymond. *Journal of the Optical Society of America*, v. 42, Mar. 1952, p. 183-186.

Effective scattering cross sections for metal spheres were measured through the resonance region, using wave-lengths between

0.45 and 15μ. Spheres of Fe and Cu sorted into reasonably narrow diameter distributions between 2 and 20μ were supported in layers on Pliofilm and AgCl. Results are in general accord with qualitative predictions based on the Mie theory. 15 ref.

7411 A New Type of Hydrogen Discharge Tube. G. H. Dieke and S. P. Cunningham. *Journal of the Optical Society of America*, v. 42, Mar. 1952, p. 187-189.

Details are given for an electrodeless hydrogen-discharge tube excited in a microwave cavity. The tube is extremely simple in construction. The hydrogen is stored as UH_3. The excitation is efficient, and the spectrum is obtained with great strength and purity. Discharge conditions can be held constant much better than in the conventional tubes.

7412 Blend Motor Oils the Modern Way. R. G. Atkinson. *Petroleum Processing*, v. 7, Apr. 1952, p. 470-474.

Describes continuous automatic blender which solves problem of batch method—accuracy, contamination, and moisture. Diagrams and illustration.

7413 How to Use 3-Way Control Valves for Efficient Operation of Heat Exchangers. J. A. Pellettere and R. L. Patton. *Petroleum Processing*, v. 7, Apr. 1952, p. 480-485.

Includes numerous diagrams.

7414 The Use of Gold Leaf as a Reference Material in the Determination of Lattice Constants by Electron Diffraction. R. I. Garrod. *Proceedings of the Physical Society*, v. 65, sec. A., Apr. 1, 1952, p. 292-293.

Briefly describes work on the above applied to several types of samples.

7415 Electron Interferometer. L. Marton. *Physical Review*, Sec. 2, v. 85, Mar. 15, 1952, p. 1057-1058.

Contains the basic principles of an interferometer operating with electron beams.

7416 Operation and Applications of the Differential Analyzer. W. G. Heffron. *Product Engineering*, v. 23, Apr. 1952, p. 164-170.

Above machine applies both speed and accuracy to the solution of differential equations. For non-linear problems, the equation need not even be written. The analyzer can work right from the curve drawn on graph paper. Illustrations and diagrams.

7417 Closer Temperature Differentials in Bimetallic Thermostats. P. R. Lee. *Product Engineering*, v. 23, Apr. 1952, p. 179-181.

Describes new bimetallic element with spread of only 2° between "on" and "off" actions. This 3-legged element has a life expectancy of one million operations. Diagrams.

7418 Logarithmic Analysis of Servo Stability. Norman Alpert. *Product Engineering*, v. 23, Apr. 1952, p. 186-190.

Describes use of logarithms giving a fast answer to the question asked in the design of any servomechanism: "Will the system hunt?" The system can now be tested analytically for stability before it leaves the drawing board. Diagrams, graphs, and illustrations.

7419 Fluid Flow Through Orifices. Raymond J. Novotny. *Product Engineering*, v. 23, Apr. 1952, p. 213, 215, 217.

Nomographic charts plus textual explanation, with numerical examples.

7420 Apparatus for Imposing and Measuring Rapid Pressure Changes in Gases. K. P. Coffin and S. H. Bauer. *Review of Scientific Instruments*, v. 23, Mar. 1952, p. 115-118.

A simple apparatus is described in which rapid volume changes can be imposed on a small reaction vessel by means of a bellows-and-cam arrangement. Limitations of the present design, and possible improvements for increased stability and sensitivity, are discussed.

7421 An Instrument for the Rapid Determination of Ionization Efficiency Curves Using the Mass Spectrometer. G. R. Hercus and J. D. Morrison. *Review of Scientific Instruments*, v. 23, Mar. 1952, p. 118-120.

7422 On the Preparation of Stilbene Crystals. R. F. Leininger. *Review of Scientific Instruments*, v. 23, Mar. 1952, p. 127-129.

A method of preparing large stilbene crystals suitable for use in scintillation counters is presented.

7423 An Induction Method for Measuring Resistance of Electrolytes. I. Fatt. *Review of Scientific Instruments*, v. 23, Mar. 1952, p. 133-135.

Describes an electrodeless method for the above.

7424 A Large Area Germanium Photocell. J. I. Pantchechnikoff. *Review of Scientific Instruments*, v. 23, Mar. 1952, p. 135.

Comprised of Ge crystal soldered onto a stud which is held concentric with a short metal sleeve by an insulator. Differs from other Ge photocells in that an extended parallel-plane geometry is obtained instead of a point contact, and in that the barrier layer exhibits no appreciable hook.

7425 A Specimen-Treating Adaptor for the Electron Microscope. Nobuji Sasaki and Ryuzo Ueda. *Review of Scientific Instruments*, v. 23, Mar. 1952, p. 136-138.

A substance already placed on the specimen holder can be subjected to a certain physical or chemical treatment and then moved to the usual position of observation without exposing it to air, in the apparatus described. Includes photomicrographs of MoO_3 after phases of oxidation and reduction.

7426 Determination of Air Velocity By Ion Transit-Time Measurements. William C. Cooley. *Review of Scientific Instruments*, v. 23, Apr. 1952, p. 151-154.

A method is described for measuring the velocity of an air stream by producing positive ions at one point in the flow and measuring the time required for the ions to be carried to an induction-type detector located a known distance (0.5 to 2.0 in.) downstream. It is believed that this method may be applied to map velocity fields in supersonic-wind-tunnel experiments.

7427 A New Method of Converting Platinum Resistance Values to Degrees Centigrade. Frank D. Werner and Alson C. Frazer. *Review of Scientific Instruments*, v. 23, Apr. 1952, p. 163-169.

A standard table and its correction table are given. They were calculated by a rapid method which is outlined. Graphical procedure for making corrections is described, as well as a graphical means of conversion, accurate to 0.01°C.

7428 Some Properties of Plastics and the Use of Plastic Apparatus at Low Temperatures. W. F. Giauque, T. H. Geballe, D. N. Lyon, and J. J. Fritz. *Review of Scientific Instruments*, v. 23, Apr. 1952, p. 169-173.

Some properties of methyl methacrylate plastic were investigated at low temperatures to supply design data needed for the construction of plastic apparatus.

7429 An Instrument for the Measurement of Cardiac Output. S. R. Powers, H. H. Rossi, and E. M. Papper. *Review of Scientific Instruments*, v. 23, Apr. 1952, p. 178-181.

A modification of the injection technique for the determination of cardiac output is presented in which the injected material is a radioactive isotope (Na^{24}). The measurement is performed with a recording unit which consists of a counting chamber, a counter with conventional amplifier, a count-rate circuit with a short RC constant (1 sec.), and a recording milliammeter. The instrumentation is described and a simple method given whereby cardiac output may be determined from the trace of the recorder.

7430 A Calibrated Stage For the R.C.A. Electron-Microscope. Joseph L. Leon. *Review of Scientific Instruments*, v. 23, Apr. 1952, p. 189-190.

Describes method and apparatus developed which enables the microscopist to record the positions of fields of interest and to return to them quickly and accurately.

7431* A New Microscope. Erwin W. Miller. *Scientific American*, v. 186, May 1952, p. 58-60, 62.

Electrons or protons from a fine needle reveal the architecture of crystals and resolve individual atoms and molecules. Illustrated.

16. *Apparatus, Methods, and Standards*

7432 New System of Quality Control Introduced by T. I. Aluminium Ltd. *Sheet Metal Industries*, v. 29, Apr. 1952, p. 345.

Describes method now in operation at the T. I. Aluminium Ltd. foundry at The South Wales Aluminium Co., Ltd. Resolven, near Neath. The speed with which results are obtained permits the checking of the metal in the furnace before it is cast, and any corrections necessary can be made immediately. The exact analysis of every slab or billet cast is known prior to casting, and the continuity of product quality and smoother production flow assured in the rolling and extrusion mills.

7433* U. S. Government Specifications. *Soap and Sanitary Chemicals*, 1952 Blue Book and Catalog Edition, p. 213, 215-233, 276.

Presents the general requirements of the U. S. Federal Specifications Board for soaps, cleaners, detergents, dishwashing compound, polishes, floor wax, insecticides, etc.

7434* Porous Ceramics for Dispersing Gases in Liquids. (In Russian.) I. S. Kainarskii and B. E. Pindrik. *Steklo i Keramika*, v. 8, Sept. 1951, p. 16-21.

The structure of porous material in relation to its efficiency in gas dispersion is discussed. Data are tabulated and charted.

7435* Electronic Peak-Reading Kilovoltmeter. *Technical News Bulletin* (National Bureau of Standards), v. 36, Apr. 1952, p. 52-53.

Describes an instrument that rapidly and accurately measures high voltages associated with medical X-ray equipment. Unit is designed to indicate directly peak voltages between 30,000 and 125,000 v. and thus replaces the sphere-gap method. It is especially useful for measuring voltages during short exposures with provisions to prevent recording of initial surges. Schematic diagram and photographs.

7436 Servomechanism Techniques Applied to Manufacturing Problems. Part One. S. P. Higgens, Jr., and G. W. McKnight. *Tele-Tech*, v. 11, May 1952, p. 64-67, 114, 116.

Test results in physical system show how servo methods can be employed for predicting system behavior. Through more efficient use of process facilities, products having greater uniformity and higher quality may be obtained. (To be continued.)

7437* The UWAC—Washington's Analog Computer. Robert von Tobel and T. M. Stout. *Trend in Engineering at the University of Washington*, v. 4, Apr. 1952, p. 10-14.

7438 Pipe Weld Site Radiography. F. H. Gottfeld. *Welding & Metal Fabrication*, v. 20, May 1952, p. 189-190 (A condensation.)

Discusses comparative values of results of X- and γ-ray inspection of 60 miles of pipeline. Also gives brief account of some comparative laboratory tests using X-rays, cobalt source, and a betatron. Tables.

7439* Measuring Very Small Pressures Below 10^{-7} Mm. Hg With the Aid of an Absorption Manometer. (In German.) M. Seddig and G. Haase. *Zeitschrift für angewandte Physik*, v. 4, Mar. 1952, p. 105-108.

Shows that above pressures can be determined on the basis of time dependence of the electron work function, the latter being measured photoelectrically by R. H. Fowler's method. Diagrams and graphs. 15 ref.

7440* Photometering by Automatic Grain Counting. (The Problem of Measuring Low-Intensity X-Ray Pictures With the Necessary High Resolution.) (In German.) O. Kratky, E. Treiber, and J. Schurz. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie*, v. 56, Feb. 1952, p. 143-146.

Describes an automatic Ag-grain counter for determining X-ray intensity distribution. It replaces the micro-photometering method and is far more sensitive. Includes diagrams and graphs. 10 ref.

Miscellaneous Publications

7441 Mathematical Machines in Sweden. (In French.) Stig Ekelöf. *Acta Polytechnica* (Electrical Engineering Series), v. 4, no. 1, 1951, 26 pages. (T1 Ac81)

7442 Flow Through Two Orifices in Series. W. M. Rohsenow, C. H. Fink, and S. R. Pollis. American Society of Mechanical Engineers, Paper 51-A-87, 1951, 4 pages. (TJ1 Am35p)

Flow characteristics of the above. Under certain conditions, a pressure rise across the second orifice is experienced. Consequently, a double orifice can be devised which will have the same measuring head as a single orifice, but will have greater pressure recovery. Graphs, diagrams, and tables.

7443 Determination of Principal Plastic Strains. W. E. Cooper. American Society of Mechanical Engineers, Paper 51-A-128, 1951, 10 pages. (TJ1 Am35p)

Techniques are presented whereby the grid method of plastic-strain determination may be extended to include determination of strain at a point, rather than over a finite gage length; and determination of principal strain, magnitude and direction, when these directions are not necessarily in alignment with the original grid. Measurement may be made in terms of either the tensor or logarithmic definitions of finite strain.

7444 Some Experimental Work on the Response of the Beta Ray Substance Gauge. W. Attwood. *Proceedings of the Technical Section, British Paper and Board Makers' Association*, v. 32, Dec. 1951, p. 771-782; disc., p. 783-788. (TS1080 P19p)

Experimental study of results given by a β-ray gage in measuring the basis weights of a range of sheet materials of different compositions. Tables and graphs.

7445 An Electronic Goniophotometer. C. A. Chester. *Proceedings of the Technical Section, British Paper and Board Makers' Association*, v. 32, Dec. 1951, p. 813-829. (TS1080 P19p)

The instrument described presents instantaneously and continuously on the screen of a cathode-ray tube a modified form of polar curve representing the light intensity specularly reflected and scattered at all angles from a plane surface. Curves from two specimens, one of which may be a standard matt white, may be presented simultaneously with their images superimposed for direct comparison. Light intensity at any selected angle may be referred to a vertical intensity scale and a horizontal angular scale. Gives immediately the information which can be obtained from a conventional goniophotometer only by plotting on sectional paper the results of many separate determinations. May be used for rapid determination of polarizing angles and as a contrast-ratio opacimeter in which the results are presented in the form of complete curves. Detailed description of optical and electrical systems.

7446 Practical Considerations in the Use of a Commercial Beta Ray Substance Gauge. E. A. Bradford. *Proceedings of the Technical Section, British Paper and Board Makers' Association*, v. 32, Dec. 1951, p. 855-874. (TS1080 P19p)

An external-reference, β-ray, substance-measuring gage is described, along with experiments performed. A later modification is also described called the internal-reference gage. Results are discussed and analyzed statistically. A number of sources of error are identified and proposals given for reducing their incidence to a minimum. Graphs and tables.

7447 Electron Interferences and Their Application. (In German.) H. Raether. *Ergebnisse der exacten Naturwissenschaften*, v. 24, 1951, p. 54-141. (QC21 Er38)

Discusses electron sources and theory of electron interferences. Describes methods of applying them in study of mechanically worked and electropolished and electrodeposited surfaces. Diagrams, photographs, and electron micrographs. 188 ref.

7448 Experimental Principles of Spectroscopy in the Centimeter and Millimeter-Wave Range. (In German.) Bernhard Koch. *Ergebnisse der exacten Naturwissenschaften*, v. 24, 1951, p. 222-274. (QC21 Er38)

Shows that spectroscopy in above ranges can help solve many chemical and physical problems. Detailed description of apparatus and procedure. Photographs, diagrams, graphs, and tables. 159 ref.

7349 Particle Size Analysis From Sedimentation Curves. Alfred H. Nissan. *Discussions of the Faraday Society*, no. 11, 1951, p. 15-27. (TK1 F22d)

Examples from sedimentation of paper-making fibers illustrate

how combining direct observations with sedimentation studies can produce useful or interesting results. The graphical tangent-intercept method of calculating frequency is compared with an algebraic method using a polynomial derived with the aid of tables prepared by Fisher and Yates and with another graphical method. 23 ref.

7450 A Miniature Electrical Pressure Gage Utilizng a Stretched Flat Diaphragm. John L. Patterson. National Advisory Committee for Aeronautics, Technical Note 2659, Apr. 1952, 47 pages. (TL570 Un3t)

Describes variable-air-gap inductance type of electrical pressure gage. It was designed to measure pressures fluctuating at high frequencies, and is also capable of measuring steady-state pressures with errors of less than 1% of full scale. Design equations and curves.

7451 A Theory and Method for Applying Interferometry to the Measurement of Certain Two-Dimensional Gaseous Density Fields. Walton L. Howes and Donald R. Buchele. National Advisory Committee for Aeronautics, Technical Note 2693, Apr. 1952, 46 pages. (TL570 Un3t)

Exact equations denoting relative density difference corresponding to an observed interference-fringe shift and optical distortion caused by refraction are derived. Corresponding approximations in the form of power-series expansions are developed to permit practical application of the theory. Expressions are derived which permit calculation of values of power-series coefficients from experimental data. The approximations are applied to available interference data in order to determine density distribution in a boundary layer formed by supersonic air flow along a flat plate.

Books

7452 Practical Radiography For Industry. H. R. Clauser. 301 pages. 1952. Reinhold Publishing Corp., New York. (QC481 C57p)

Concrete working information on modern radiographic techniques. Nearly 200 illustrations, including sample radiographs. Separate chapters are devoted to radiography with radium and Co^{60}, fluoroscopy, and miscellaneous applications.

7453 Engineers' Illustrated Thesaurus. Herbert Herkimer. 572 pages. 1952. Chemical Publishing Co., New York. (TA151 H42e)

Encyclopedia of machine designs. Every conceivable type of machine element is clearly reproduced and identified. Where necessary, an explanation of the method by which it accomplishes its particular function is given. Sketches of related parts are logically grouped for their suggestive value. Index.

7454 Nomography and Empirical Equations. Lee H. Johnson. 150 pages. 1952. John Wiley & Sons, New York. (QA90 J63n)

Explains two useful techniques for handling experimental data, namely, nomographs, and empirical equations. The treatment of nomographs is based upon plane geometry and logarithms. The treatment of empirical equations requires a knowledge of logarithms and analytical geometry.

7455 Le Microscope Électronique et ses Applications. (The Electron Microscope and Its Applications.) T. Reis. 202 pages. 1951. Presses Universitaires de France, 108 Blvd. St. Germain, Paris. (QH211 R27m)

Presents a detailed account of the above. Part I discusses limits of vision and principles of the optics of light, theoretical principles of electronic optics, parts of the electron microscope, commercially available types, and future prospects. Part II discusses preparation of specimens, and application of the microscope in the fields of chemistry, metallurgy, and biology.

See also:

6838 (measurement and recording temperature of liquid steel)
6861 (instrumentation for steelmaking)
6946 (finish standards for machine tooling)
6968 (inspection of Al tanks)
7050 (measurement of Fe films)
7078 (vacuum-evaporation apparatus)
7117 (radiographs, reproduction of)
7332 (crystallographic analysis with electron microscope)
7675 (engineering drawing)
7685 (new radioactivity counters in chemical engineering)
7712 (directory of facilities for petrochemicals)
7720 (textile resistance test)
7808 (calorimeter for heat of wetting)
7809 (method for study of radiocolloids)
8048 (measuring with mass spectrometers)
8056 (aerosol test method)
8057 (method for evaluating insecticides)
8104 (ultrasonics in nondestructive testing)
8220 (computing equipment for fluid-flow problems)
8226 (electronic magnet current stabilizer)
8247 (computer-recorder for ratio measurements)

17. METALS—FABRICATION AND USES

7456* Concerning Some Applications of Light Alloys For Bearings in Railway Equipment. (In Italian.) L. Paglialunga. *Allumino*, v. 21, Jan. 1952, p. 43-47.

Experimental results in comparison with other bearing metals show better high-temperature wear and fatigue resistance. Illustrated.

7457* High Temperature Materials For the Gas Turbine. A. R. Edwards. *Australasian Engineer*, Feb. 7, 1952, p. 64-68. [From Symposium on "Modern Trends in Non-Ferrous Metals and Alloys."]

Main requirements for heat-resistant materials in turbine engines are outlined. Creep resistance is shown to be the most important criterion in selecting alloys for high-temperature service, time-extension curves being the basis of design data. The best of the current alloys are grouped according to their applications, and consideration is given to significant features of their compositions and microstructures. Short discussion of future trends. 14 ref.

7458* Stainless Alloys Used In Traumatological and Orthopedic Sûrgery. (In Portuguese.) Lybio Antunes Maciel. *Boletim da Associaçao Brasiliera de Metais*, v. 7, Oct. 1951, p. 520-523; disc., p. 523-526.

Discusses the above, examining principally austenitic stainless alloys and the alloy "Vitallium".

7459* Aluminum Magnet Wire. Robert W. Carson. *Electrical Manufacturing*, v. 49, May 1952, p. 134-139, 312, 314, 316, 318.

Traditional use of Cu as an electrical conductor is being challenged by Al on a cost basis. Recent price trends suggest that the initial production applications for Al magnet wire described presage a growing field of use. Includes data on physical and mechanical properties of Cu and Al.

7460 For Certain High-Temperature Applications Liquid Metals Are Good Heat-Transfer Agents. Thomas Trocki. *General Electric Reviews*, v. 55, May 1952, p. 22-25, 60.

Discusses advantages, disadvantages, and corrosion problems; describes equipment for use of Na and a Na-K alloy. Photographs.

7461* Modern Permanent Magnet Practice. F. G. Tyack. *Machinery Lloyd* (Overseas Edition), v. 24, Mar. 29, 1952, p. 77-79, 81-84.

Discusses applications for permanent magnets, performance curves, materials, manufacture, and effect of temperature.

7462 The Metals Used For Mechanical Springs. F. P. Zimmerli. *Metal Progress*, v. 61, May 1952, p. 97-106.

The first portion of the 1951 William Park Woodside lecture. Remaining portions will be published later. Discusses various steels, Cu alloys, and Ni alloys. Considers their mechanical and other properties, compositions, and selection for specific usage. Tables. (To be continued.)

7463* Technical Background for Further Tin Conservation. R. R. Hartwell. *Modern Lithography*, v. 20, Mar. 1952, p. 49, 51, 53, 113, 115; Apr. 1952, p. 61, 63.

Discusses the above in relation to NPA Order M-25 with special reference to electrolytic tinplate for food containers, and substitutes for hot-dipped plate. Considers relative corrosion resistance to different foods of different thicknesses of tin plating.

17. *Metals—Fabrication and Uses*

7464 Use of Aluminum Pipe in Oil Country Applications. William B. Moore, Jr. *Petroleum Engineer*, v. 24, Apr. 1952, p. D28, D30, D32.

An illustrated survey of mechanical and corrosion-resistant properties and uses in above applications.

7465* Elastic Properties of Zinc Die Castings Are Useful for Adjustable Parts. *Precision Metal Molding*, v. 10, Apr. 1952, p. 48, 108, 111.

Illustrates above by briefly describing some parts made by Partlow Corp., New Hartford, N. Y., for a temperature-indicating controller.

7466 Expanded Metal. Robert P. Ingols. *Product Engineering*, v. 23, Apr. 1952, p. 199-202.

Mechanical, dimensional, and other properties of different designs of carbon steel, stainless Al, and special-property alloys. A few of the many applications are machine guards, ventilating panels, functional and decorative parts in electrical assemblies. Data are tabulated and discussed.

7467* Stainless and Acid-Resistant Steels in Chemical Engineering. (In German.) Hermann Braun. *Werkstoffe und Korrosion*, v. 3, Mar. 1952, p. 93-98.

Discusses selection of the above, indicating that the most highly alloyed type is not always the best for a particular application. Various types of corrosion are illustrated; typical data are charted.

Miscellaneous Publications

7468 History and Development of Aluminium Silicon Alloys. E. Scheuer. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. B40-B49. (TS200 In7p)

Starts with the history of Al-Si alloys from their first preparation roughly 100 years ago, to their first industrial application in 1920. Theoretical aspects of the modification process are dealt with in some detail, followed by development of other Al-Si alloys combining the good casting properties of the eutectic alloy with better machinability and greater stiffness. Deals with special applications of Al-Si alloys, including a group developed for pistons which exploits the low coefficient of expansion and high wear-resistance produced by Si additions, and the few specific cases where Al-Si alloys are utilized in the wrought form. 36 ref.

7469 Where Is Cast Iron Going To? P. A. Russell. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. B110-B120; disc., p. B120-B123. (TS200 In7p)

Discusses economic and technological trends. Mechanical properties are tabulated and charted; microstructures are illustrated.

7470 The Future of the Light Metals. H. Sutton. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 246-252; disc., p. 265-268. (HC13 Un3p)

Early history and essential features of modern methods of production. Possible alternative methods are mentioned. Recovery of aluminium from scrap and used parts. Applications. Recent advances in the Mg-alloy field. Position of the less common light metals, Be and Ti, is indicated. 36 ref.

7471 Possibilities and Limitations in the Substitution of Light Metals For Steel and Copper. Jean Matter. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 254-256; disc., p. 265-268. (HC13 Un3p)

Shows savings that can be effected by substitution of Al alloys for steel, Cu, and Sn. With regard to substitution for steel, the extra cost involved by the use of light alloys in the place of steel for freight cars can be amortized in 25½ mos. in the case of Al and in 48 mos. in the case of coal. In the case of Cu, use of Al in electric cables is said to permit a saving of up to one ton of Cu per km. of line at 60,000 volts. Substitution for tinplate in the manufacture of milk cans enables a saving of about 1 kg. of tin per can.

See also:

6813 (application of Mg)
6891 (Al core boxes)
6901 (Al bronze in high-pressure castings)
6949 (low W and V tool steel)
6961 (powdered metal for bearings)
6967 (Al powders and pastes)
7210 (uses for Ni and alloys)
7265 (materials for gas turbines)
7653 (materials for airframe construction)
7940 (Be copper in plastics molds)
8235 (Fe-powder magnets)
8342 (clad Cu for high-temperature service)

18. POLLUTION AND WASTES

7472* Controlling Corrosive Air Pollutants. Kempton H. Roll. *Air Repair*, v. 1, May 1952, p. 6-10.

A review of some systems being used currently for the above. Photographs and diagram.

7473* Incineration of Wood Waste in the Los Angeles Area. Robert L. Chass and Edward S. Feldman. *Air Repair*, v. 1, May 1952, p. 54-61. (Condensed from *Journal of the Forest Products Research Society*).

A discussion of various phases of the above. Includes legal aspects, smog composition, standard operating procedures for silo-type incinerators, and principles of incinerator design. Diagrams.

7474 Ventilation at Non-Ferrous Melting and Pouring Operations. Herbert J. Weber. *American Foundryman*, v. 21, Apr. 1952, p. 125-131.

Costs, practical applications, and deficiencies of typical exhaust ventilation for the above are described and illustrated by photographs of equipment in actual operation. Discusses legal and toxicological aspects.

7475* Heat Losses in the Cleaning of Central Generator Gas and Their Reduction. (In German.) Otto Krebs. *Bau und Betrieb*, v. 4, Apr. 1952, p. 5-6. (Supplement to *Gas- und Wasserfach*, v. 93, Apr. 1, 1952.)

Discusses loss of heat during the wet method of cleaning generator gas and shows that the cyclone dust precipitator reduces this heat loss considerably. Other gas-cleaning methods are briefly discussed and evaluated. Graphs and tables.

7476 Stacks for Pollution Control. III. S. R. Steinbock. *Chemical Engineering*, v. 59, Apr. 1952, p. 154-155.

Presents a numerical calculation example and charts on particle dispersion as a guide in selection of stack heights.

7477 Dispersion From Short Stacks. C. A. Gosline. *Chemical Engineering Progress* (Engineering Section), v. 48, Apr. 1952, p. 165-172; disc., p. 172.

Compares experimental results obtained from a plant-scale study with theories of Bosanguet, Sutlon, and Church. Describes use of data for design of stacks for waste disposal. Graphs and tables. 15 ref.

7478 Increased Interest in Smoke Abatement Focuses Attention on Electrostatic Precipitation. W. W. Moore and H. L. Richardson. *Combustion*, v. 23, Apr. 1952, p. 49-52.

The principles of operation of an electrostatic precipitator are explained and illustrated, and a recently developed continuous or sequential rapping system that avoids puffs is described.

7479* Waste-Pollution Problem Solved by Engineering the "Ounce of Prevention". E. M. Van Patten and G. H. McIntosh. *Food Engineering*, v. 24, Apr. 1952, p. 61-64, 153-154.

Tells how American Maize Products Co., Chicago, stops virtually all stream hazards, cuts water needs, and increases plant output—by elimination and recovery technique.

7480* Air-Conditioning Odors Banished by New Treatment. E. R. Woodward and E. G. Fenrich. *Food Engineering*, v. 24, Apr. 1952, p. 75-76, 207.

Offensive gases evolved during processing are evacuated to base of outside scrubber tower, and chlorine dioxide deodorizer solution is recirculated to absorption system. Success in many plants cited.

7481 Ion Exchange Saves Chromic Acid. *Iron Age*, v. 169, May 1, 1952, p. 152.

Ion exchange is being successfully used by an Eastern aircraft manufacturer to recover valuable Cr and CrO_4 from plant waste.

7482* Treatment of Waste Waters From the Manufacture of Penicillin. G. E. Eden and G. F. Lowden. *Manufacturing Chemist and Manufacturing Perfumer*, v. 23, Apr. 1952, p. 144-148.

Reports experimental work carried out in 1946 with the object of finding a method of disposal of the effluent from a factory in northern England. Tables and graphs.

7483* Profitable Chromate Wastes. C. F. Paulson. *Metal Finishing*, v. 50, May 1952, p. 48-50, 56.

Discusses a process operating on a commercial scale which eliminates stream pollution and returns the chromate in usable form to the treatment bank.

7484 The Mass Concentration of Air-Borne Dusts. P. F. Holt. *Metallurgia*, v. 45, Mar. 1952, p. 156-157.

Discusses use and advantages of dimethylterephthalate as a filter base in determination of the above.

7485* Role of By-Product Recovery in Industrial Waste Treatment. R. R. Evans. *Plant*, v. 5, May 1952, p. 40-42, 65.

Five basic approaches to the majority of the problems are outlined and successful work being done in various fields is discussed.

7486* New Slants on Smoke. Paul A. Dobbs. *Power Engineering*, v. 56, May 1952, p. 69-70.

Discusses smoke-control programs. Offers some convincing reasons why some modification of current practice by both industry and community would be desirable.

7487* Use of Calcium Chloride in the Treatment of Industrial Wastes. Joseph A. McCarthy. *Sewage and Industrial Wastes*, v. 24, Apr. 1952, p. 473-479.

With respect to the above, presents the results of full-scale operations in New England plants and further experimental developments in textile wastes, as well as wastes from other industries.

7488* Rag, Rope, and Wastes From Specialty Paper Mills. I. Physical and Chemical Characteristics. Willem Rudolfs and N. L. Nemerow. *Sewage and Industrial Wastes*, v. 24, Apr. 1952, p. 480-484.

An extensive study over a period of several years was made concerning the origin of the wastes, surveys of mills, determination of the quantities, sanitary characteristics, and organic composition of the wastes, followed by load distribution of the cooking liquors in relation to the beater washings, and chemical, anaerobic, and aerobic treatment of the wastes. The results obtained are presented.

7489* Chemical and Antibiotic Wastes Treatment at Willow Island, West Virginia. I. Present Chemical Wastes Treatment. John F. Vogler. **II. Aureomycin Wastes.** J. M. Brown. **III. Design of the Additional Treatment Facilities.** Guy E. Griffin. *Sewage and Industrial Wastes*, v. 24, Apr. 1952, p. 485-495.

Products of Willow Island plant are melamine, iron blue, chrome yellow, chrome green, and molybdate orange pigments; brighteners; folic acid; and pharmaceutical intermediates.

7490* Nutritional Requirements in the Biological Stabilization of Industrial Wastes. III. Treatment with Supplementary Nutrients. E. N. Helmers, J. D. Frame, A. E. Greenberg, and C. N. Sawyer. *Sewage and Industrial Wastes*, v. 24, Apr. 1952, p. 496-507.

Provides a basis for determining the magnitude of nutritional deficiencies in activated sludge treatment under such circumstances and to establish the proper amounts of supplementary nutrient material that must be added to achieve required treatment efficiencies.

7491* Pulp Mill Location Study in Regard to Water Pollution. Robert O. Sylvester. *Sewage and Industrial Wastes*, v. 24, Apr. 1952, p. 508-521.

The survey and study of the Willapa River estuary described was made by the survey group of the Washington State Pollution Control Commission.

7492* Curve For Efficiency of Dust Removal; Its Nature and Application for Improving the Performance of Dust Removers. (In German.) F. W. Mayer. *Staub*, Mar. 15, 1952, p. 15-30.

A mechanical and graphical method of establishing an efficiency curve for dust-removal equipment is described. Diagrams, graphs, and tables. 10 ref.

Miscellaneous Publications

7493 Treatment of Waste Gases. Walter A. Schmidt. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 183-190; disc., p. 204-210. (HC13 Un3p)

Discusses the above, especially as applied to gaseous wastes from the metallurgical industries. The various types of recovery methods are reviewed and advantages and disadvantages discussed. 37 ref.

See also:
6787 (pollution prevention of coal-processing plant)
6863 (silicosis prevention in molding)
7538 (wood-burning incinerators)
7711 (fertilizer from refinery waste)
7721 (Kraft mill wastes)
7773 (evaporation from drops)
7829 (aggregation of aerosols)

19. FUEL TECHNOLOGY

7494* Means of Approximate Calculation of Methane Sorption Capacity of Coal at Atmospheric Pressure. (In Russian.) I. L. Eittinger. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 21, 1952, p. 427-430.

In order to predict methane evolution in coal mines, isobars of methane sorption capacity of various coals were constructed from laboratory data. Use of these charts is explained and discussed.

7495* Certain Problems of Investigating the Fine Structure of Coal. (In Russian.) V. I. Kasatochkin. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Sept. 1951, p. 1321-1334.

The metamorphism of the crystal structure of coal was studied by means of X-rays and the electron microscope. Tables, graphs, and micrographs. 14 ref.

7496* Alcohol Motor Fuels. S. J. W. Pleeth. *Automobile Engineer*, v. 42, Apr. 1952, p. 137-140.

A survey of the above. Includes table of calorific value of motor fuels.

7497 1952 Outlook: Gas and Liquids From Coal. *Chemical Engineering*, v. 59, Apr. 1952, p. 299-300, 302-304, 306-308, 310-312, 314.

Reviews papers presented at the 173rd general meeting of AIME in a symposium on above. Includes: cost estimation of a 250-million-cubic-feet-a-day pipeline gas plant; description of the Bureau of Mines coal-hydrogenation process; and description of the new Texaco process, an improvement on Fischer-Tropsch. Discusses production of inorganic chemicals. Flow diagram.

7498 Underground Gasification; Progress, Problems, Prospects. *Coal Age*, v. 57, Apr. 1952, p. 96-67.

Covers gasification history, methods, problems, goals, and results.

7499* Oxidation of Coal in Air Studied by Thermogravimetry Between 100 and 270°. (In French.) Jean Chéreau. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 10, 1952, p. 1165-1166.

Outlines experimental results. Graphs.

7500* Stabilization of the Deflagration Wave in a Divergent Tube. (In French.) Marcel Barrere. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 24, 1952, p. 1347-1349.

Describes experimental apparatus for above purpose, making it possible to eliminate certain difficulties which have heretofore interfered with study of the true geometric shape of the flame or deflagration front, which is modified considerably by wall effects. Photographs show typical results.

19. *Fuel Technology*

7501* An Anomaly in the Thermogravimetric Isothermals Produced by Coal Heated in the Presence of Air. (In French.) Jean Chéreau. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 24, 1952, p. 1368-1370.

Upon heating pulverized coal in contact with air, an anomalous break in the curve is often noted prior to the removal of all of the moisture content. Two families of curves show effects of temperature with grain size held constant and of grain size with temperature held constant, respectively. Discusses theoretical explanation.

7502 Burning Velocity Determinations. Part 8. Some Acetylene+Oxygen+Inert Gas Mixtures. P. J. Wheatley and J. W. Linnett. *Transactions of the Faraday Society,* v. 48, Apr. 1952, p. 338-345.

23 references.

7503* Experiences on the Coking of American Coal. (In German.) Eberhard Hecker. *Gas- und Wasserfach,* v. 93, Mar. 1, 1952, p. 118-123.

Research and observation of above indicated great advantages of high-grade West Virginia coal over Ruhr coal. Graphs and tables.

7504* Methods of Investigating City Gas. (In German.) Paul Struck. *Gas- und Wasserfach,* v. 93, Feb. 1, 1952, p. 71-75; Mar. 1, 1952, p. 133-136; Apr. 1, 1952, p. 182-190.

Discusses and illustrates methods of studying physical and chemical properties of city gas, with special emphasis on the heating value of the gas, and describes methods and equipment of analyzing city gas for its various components. Data are tabulated and graphed. 16 ref.

7505 Combustion Analysis Simplified. F. W. Hutchison. *Heating and Ventilating,* v. 49, May 1952, p. 85-96.

Fundamental principles of the combustion process are set forth together with a clear explanation of making a mathematical interpretation of fuel analysis and Orsat readings. Practical, detailed examples are given.

7506 Detection of Diatomic Radical Absorption Spectra During Combustion. R. G. W. Norrish, G. Porter, and B. A. Thrush. *Nature,* v. 169, Apr. 5, 1952, p. 582-583.

7507* Methanol as a Hydrate Inhibitor. Robert M. Woolfolk, Jr. *Oil and Gas Journal,* v. 50, Apr. 21, 1952, p. 124, 159-160.

Explains how hydrate formaton was prevented by using only 1.85 gal. of methanol per million cubic feet of gas. Describes equipment and outlines procedure for computing amounts of methanol to use.

7508 West Texas Natural Gasolines—Their Compositions and Properties. V. R. Ratzlow and A. A. Ruoho. *Petroleum Refiner,* v. 31, Apr. 1952, p. 125-128.

These gasolines were carefully fractionated into 0.1 vol. % or smaller fractions which were analyzed to determine the compositions. The distribution of sulfur in these gasolines was also determined, as were the antiknock and other physical properties of fractions simulating products that are, or could be, manufactured commercially.

7509* Electron Microscope Helps Bring Cheaper Fuel and Longer Life for Diesels. *Railway Age,* v. 132, Apr. 28, 1952, p. 46-49.

Denver & Rio Grande Western's research laboratory have used the electron microscope to study fuel oils. This research is discussed and advantages such as fuel oil from cheaper sources, and optimum lubricant and additive combinations, are presented.

7510 Flame Propagation; the Measurement of Burning Velocities of Slow Flames and the Determination of Limits of Combustion. Alfred Egerton and S. K. Thabet. *Proceedings of the Royal Society,* v. 211, ser. A, Mar. 20, 1952, p. 445-471.

Describes a method for measuring burning velocities of combustible gas/air mixtures near limits of combustion, using a burner providing a flat disk-shaped flame. Technique is applied to methane, propane, n-pentane, ethylene, acetylene, and benzene flames of velocities 5-10 cm./s. Characteristics of the burner and flames are discussed. Apparatus diagrams, graphs, tables, potographs, and 15 ref.

7511 Advantages of Propane as a Transit Vehicle Fuel. Robert S. Lee. *SAE Quarterly Transactions,* v. 6, Apr. 1952, p. 213-219.

7512* Pulverized Coal Firing. Edmund McCarthy. *Utilization,* v. 6, Apr. 1952, p. 43-47.

Discusses design factors, operating characteristics, and fuel requirements of modern pulverized, coal-fired steam generators.

7513* Soot Formation and Radical Equilibria in Flames. (In German.) H. Behrens. *Zeitschrift für physikalische Chemie,* v. 199, Jan. 1952, p. 1-14.

Soot formation accompanied by luminosity is found to increase radiation by a factor of 5-10 and, thus, increase utilization of thermal energy. Conditions for increased formation of carbon black were investigated. 19 ref.

7514* Ionization and Luminescence in Flames. (In German.) E. Sänger, P. Goercke, and I. Bredt. *Zeitschrift für physikalische Chemie,* v. 199, Jan. 1952, p. 46-48.

Discusses theory of formation and possibilities of computing above. Graphs and tables. 22 ref.

7515* Study of the Reduction of CO_2 by Natural Coke. (In Russian.) V. N. Ershov and V. V. Pomerantsev. *Zhurnal Prikladnoi Khimii,* v. 24, May 1951, p. 520-526.

Apparatus is diagrammed; data are charted and tabulated.

7516* Investigation of the Influence of Additions of Sodium Compounds on the Semicoking of Coal. (In Russian.) M. B. Ravich, V. A. Lanin, and V. I. Korshunov. *Zhurnal Prikladnoi Khimii,* v. 24, Sept. 1951, p. 970-975.

Na_2CO_3, NaCl, and NaOH were used in the above investigation. NaOH was found to be the most active catalyst. Data are tabulated.

Miscellaneous Publications

7517 Theoretical and Practical Aspects of Coal and Coke Testing. B. P. Mulcahy. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1951, p. 54-83; disc., p. 83-89. (TN713 Am35p)

Presents comprehensive and critical discussion of the above. Representative data are tabulated and charted. Conclusions are summarized. 17 ref.

7518 The Apparent Solubility of Colloidal Materials Comprising a Continuous Distribution of Micellar Size, With Special Reference to Coals. I. G. C. Dryden. *Discussions of the Faraday Society,* no. 11, 1951, p. 28-42. (TK1 F22d)

Theory and experimental data. 25 ref.

7519 An Active Particle Diffusion Theory of Flame Quenching for Laminar Flames. Dorothy M. Simon and Frank E. Belles. National Advisory Committee for Aeronautics, Research Memorandum E51L18, Mar. 4, 1952, 24 pages. (TL782 Un3rm)

An approximate equation is derived for quenching distance based on effect of destruction of atoms and free radicals by a surface, on chemical reaction, and on flame propagation. 13 ref.

7520 Variation of Pressure Limits of Flame Propagation With Tube Diameter for Various Isooctane-Oxygen-Nitrogen Mixtures. Adolph E. Spakowski and Frank E. Belles. National Advisory Committee for Aeronautics, Research Memorandum E52A08, Mar. 3, 1952, 20 pages. (TL782 Uu3rm)

Effects of O_2 concentration upon pressure and concentration limits of flame propagation were also investigated. Low-pressure propagation limits were measured for quiescent isooctane-O_2-N_2 mixtures in cylindrical glass tubes.

7521 Flame Speeds of 2,2,4-Trimethylpentane-Oxygen-Nitrogen Mixtures. Gordon L. Dugger and Dorothy D. Graab. National Advisory Committee for Aeroanutics, Technical Note 2680, Apr. 1952, 25 pages. (TL570 Un3t)

The above with various O_2-N_2 mixtures was determined from schlieren photographs of Bunsen-type flames. Flame-speed data were obtained as a function of equivalence ratio with air at

several initial temperatures, and with several premixed O_2-N_2 mixtures at two initial temperatures. 15 ref.

7522 Carbonizing Properties: Chilton Coal From Lorado No. 5 Mine, Lorado, Logan County, W. Va. J. D. Davis, D. A. Reynolds, D. E. Wolfson, W. H. Ode, and B. W. Naugle. U. S. Bureau of Mines, Bulletin 500, 1951, 26 pages. (TN21 Un3b)

7523 Limits of Flammability of Gases and Vapors. H. F. Coward and G. W. Jones. U. S. Bureau of Mines, Bulletin 503, 1952, 155 pages. (TN21 Un3b)

Data on the above are arranged, coordinated, and critically reviewed. A number of results not hitherto published are included. There are now 155 substances in the summary of flammability limits in air and in oxygen as against 26 in the first edition. The first 14 pages describe determination procedures and discuss theoretical considerations.

7524 Studies of the Extraction and Cooking of Coal and Their Significance in Relation to Its Structure. M. Orchin, C. Golumbic, J. E. Anderson, and H. H. Storch. U. S. Bureau of Mines, Bulletin 505, 1951, 15 pages. (TN21 Un3b)

Concerned with dispersion of coal by solvents at atmospheric pressure and high temperature and destruction and regeneration of the coking properties of coal. Results of experiments are charted, tabulated, and illustrated.

7525 Carbonizing Properties: British Columbia, Matanuska Valley (Alaska), and Washington Coals and Blends of Six of Them With Lower Sunnyside (Utah) Coals. J. D. David, D. A. Reynolds, R. E. Brewer, B. W. Naugle, D. E. Wolfson, F. H. Gibson, and G. W. Birge, U. S. Bureau of Mines, Bulletin 510, 1952, 42 pages.. (TN21 Un3b)

7526 Carbonizing Properties: Eastern Kentucky Coals From Elkhorn No. 1, Elkhorn No. 2, Leatherwood, and Harlan Beds. J. D. Davis, D. A. Reynolds, R. E. Brewer, D. E. Wolfson, B. W. Naugle, W. H. Frederic, and G. W. Birge. U. S. Bureau of Mines, Bulletin 511, 1952, 33 pages. (TN21 Un3b)

See also:
6858 (properties of coke)
7718 (chemical utilization of coal)
8321 (coking-coal reserves)

20. HEATING, DRYING, AND AIR CONDITIONING

7527* Thermodynamic Cycles of Dynamic Heating Using Differences of Temperature in the Cold Season. (In Russian.) L. M. Rozenfel'd. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 21, 1952, p. 393-396.

The cycles are discussed. A schematic diagram of a proposed system is shown.

7528* Causes of Fouling of the Firing Surfaces of Boilers, Economizers, and Air Heaters, and Means for Its Prevention. (In French.) G. Costes. *Chaleur et Industrie*, v. 33, Mar. 1952, p. 67-76.

Discusses the above with respect to powdered and nonadhesive deposits and more or less hard and adhesive deposits at normal and low temperatures. Presents results of experiments conducted on this problem. Graphs.

7529* Analytical Theory and Practical Calculation of Elevated Radiant-Panel Heating. (In French.) A. Missenard *Chaleur et Industrie*, v. 33, Mar. 1952, p. 87-90.

Short supplement to article appearing in May-June 1951 issue, answering questions submitted by readers on above problem. Includes photographs and schematic drawings.

7530* Thermodynamic Values and Technological Behavior of Losses in Heat-Transfer Devices. (In German.) H. Glaser. *Chemie- Ingenieur-Technik*, v. 24, Mar. 1952, p. 135-141.

An attempt was made to create a rating scale by means of which the efficiency of above apparatus can be determined. Clarified by graphs.

7531* Principles of the Economical Design of Heat Transfer Devices. (In German.) O. Walger. *Chemie-Ingenieur-Technik*, v. 24, Mar. 1952, p. 142-145.

The numerous proposals for economical evaluation of heat-transfer devices are countered with the suggestion that the costs for the total length of pipe required be made the most important consideration in an economic evaluation of various designs. Comparisons are made uniformly and systematically for longitudinal flow in tubes and for transverse flow through nests of tubes with the inclusion of ribbed tubes. Transverse-flow arrangements with small intervals between the tubes were found to be economically superior, particularly with low Reynolds numbers. 14 ref.

7532 Some Basic Principles; Effective Heat and Heat Loss Calculations. C. O. Mackey and N. R. Gay. *Heating, Piping & Air Conditioning*, v. 23, Dec. 1951, p. 94-96.

Presents an attempt to establish some agreement on some of the basic and fundamental principles of heat transfer as applied to space heating. (To be concluded)

7533 Cooling Panels, Conditioned Air Used at New Glass Yarn Plant. *Heating, Piping, & Air Conditioning*, v. 24, Apr. 1952, p. 102-103.

Describes a unique cooling and air-conditioning system which combines radiant-panel cooling with distribution of completely conditioned air which allows workmen to operate amid temperatures exceeding 2000°F. The new system holds temperatures to a maximum of 80°F. and eliminates more than 90% of the heat radiations in the area surrounded on 3 sides by the furnace.

7534 A V-Wire Direction Probe. H. B. Nottage, J. G. Slaby, and W. P. Gojsza. *Heating, Piping, & Air Conditioning*, v. 24, Apr. 1952, p. 123-126.

Construction and experience in use are reported for a simple type of direction-measuring probe developed for room air-distribution research and employing remote operation and indication. Emphasis is given to the importance of direction as a necessary measurement for vector quantities such as velocity, momentum, and force.

7535 Outlet Turbulence Intensity as a Factor in Isothermal-Jet Flow. H. B. Nottage, J. G. Slaby, and W. P. Gojsza. *Heating, Piping, & Air Conditioning*, v. 24, May 1952, p. 117-121.

An exploratory test showed that outlet turbulence intensity is a significant factor in isothermal ventilation-jet flow when the outlet velocity is low. Of importance in outlet design and in layout of rooms for air-conditioning system. A Schubauer type of heat-diffusion turbulence indicator was developed for use under ventilation conditions. Apparatus diagrams and graphs.

7536 The Industrial Atmosphere—A Symposium. Parts I and II. *Heating Piping, & Air Conditioning*, v. 24, Apr. 1952, p. 127-132; May 1952, p. 122-127; disc., p. 127-129.

Includes the following: "Integration of Process and Human Requirements", H. A. Mosher; "Effect of Atmospheric Requirements on Industrial Architecture and Plant Layout," A. T. Waidelich and W. A. Hunting; "Effects of Industrial Atmosphere on Workmen and on Community", Robert A. Kehoe; and "Equipment for Industrial Ventilation and Air Pollution Control", R. P. Warren. (Two articles in each issue.)

7537 Theory vs. Practice in Radiant Heating. T. Napier Adlam. *Heating and Ventilating*, v. 49, May 1952, p. 97-101.

Discussion of American and English practice concerning radiant heating. Data are presented on the installation of Cu tubing in ceiling panels, placement of plaster, venting, and elimination of air pockets.

7538 Atmospheric Pollution. Louis C. McCabe. *Industrial and Engineering Chemistry*, v. 44, Apr. 1952, p. 111A-112A.

Properly designed multiple-chamber wood-burning incinerators, although more expensive, are said to be much easier to control than the single-chamber (silo) type. They are described and diagrammed.

7539 Operating Experiences With Cyclone-Fired Steam Generators. V. L. Stone and I. L. Wade. *Mechanical Engineering*, v. 74, May 1952, p. 359-368.

Five years of cyclone-furnace operation. Knowledge gained on

20. *Heating, Drying, and Air Conditioning*

10 different boiler installations by the Commonwealth Edison Company and the Public Service Company of Northern Illinois. Extensive tables.

7540 Resistance Heating of Mild-Steel Containers at Power Frequencies; Conductive Heating of Pipes and Inductive Heating of Vessels. C. A. M. Thornton. *Proceedings of the Institution of Electrical Engineers,* v. 99, pt. 2, Apr. 1952, p. 85-93.

Gives some details of actual installations and of empirical formulas developed by the author from numerous tests, and used in the design of new installations. 20 ref.

21. PRIME MOVERS

7541 The Noise Field of a Turbo-Jet Engine. H. E. von Gierke, H. O. Parrack, W. J. Gannon, and R. G. Hansen. *Journal of the Acoustical Society of America,* v. 24, Mar. 1952, p. 169-174.

Noise fields generated by a standard turbojet aircraft engine were measured for 3 different power settings. Measurements were made at points on circles around the engine having radii of 25 and 50 ft. From these measurements, total acoustic power radiated from the engine is calculated to be approximately 69 kw. at full engine power. Distribution of this power over the different frequency bands and space angles is shown.

7542 Design Characteristics for Noise Control of Jet Engine Test Cells. Howard C. Hardy. *Journal of the Acoustical Society of America,* v. 24, Mar. 1952, p. 185-190.

An example is shown of steps in design of the structure for noise control of a jet-engine test cell from determination of the design goal to the final acoustic treatment of the cell.

7543 A New Aviation Fuel Lead Scavenger. V. E. Yust. *Aero Digest,* v. 64, Apr. 1952, p. 76, 78, 80.

Presents results of study conducted to establish the cause and mechanism of spark-plug fouling. Typical data on fouled and satisfactory plugs which had been used with the standard scavenger are shown.

7544* Peacetime Impact of Atomic Energy. *Analysts Journal,* v. 8, Jan. 1952, p. 85-93.

Verbatim report of speeches presented at the Eastern Regional Conference, New York Society of Security Analysts. General topics are "Raw Materials of Atomic Energy"; "Possible Developments in Power and Heat"; and "Isotopes and Instrumentation."

7545* Gas Turbines and Heating Plants: Their Design and Construction. (In French.) Maurice Bouffort. *Chaleur & Industrie,* Feb. 1952, p. 33-39; Mar. 1952, p. 77-86.

Extensive tables, graphs, and calculations.

7546* Gas Turbines. Part 2(a). I. G. Bowen. *Coke and Gas,* v. 14, Apr. 1952, p. 125-130.

Deals with the fuels used in gas turbines. Discusses the sources of supply and properties of fuels with particular reference to oil. (To be continued.)

7547* Dual-Fuel Engine Proves Money Maker for Falls City, Neb. *Diesel Power,* v. 30, Apr. 1952, p. 56-57.

Describes F-M 2800-hp. unit which generates power at a fuel cost of 3.15 mills per kw. hr. giving this city some of the lowest electric rates in Nebraska. This economy is being achieved with 20c gas and 11c fuel oil and represents a saving of 63% compared with previous diesel fuel costs.

7548* "Dopes" and Additives. (A Bibliography.) (In German.) A. Zwergal and H. Umstätter. *Erdöl und Kohle,* v. 5, Mar. 1952, p. 177-180.

Includes inhibitors, activators, knock inhibitors, crystallization retarders, viscosity-index improvers, and rheologically active substances for addition to liquid fuels and lubricants. 43 ref. (To be continued.)

7549* On the Vaporization and Combustion Properties of Gasoline Spray. (In English.) Fujo Nagao and Syun'iti Ohigashi. *Memoirs of the Faculty of Engineering* (Kyoto University), v. 14, Jan. 1952, p. 38-62.

Describes a study of the above in reference to the gasoline-injection engine. Fuel was injected into a bomb filled with air at a desired density and ignited, and the effects of several factors on the process of vaporization and the extent of combustion were investigated. Photographs and numerous diagrams.

7550 Electric Motor Drives. John W. Greve. *Machine Design,* v. 24, Apr. 1952, p. 126-188.

Includes the following topics: "General Considerations"; "Mechanical Features"; "Electrical Features"; and "General Application Factors." Tables, illustrations, and diagrams.

7551 Free-Piston Engine for Air Compression and Turbine Gas Generation. A. L. London and A. K. Oppenheim. *Machine Design,* v. 24, Apr. 1952, p. 211-312, 272.

Describes mechanics and theory of the above. Includes illustrations and diagrams.

7552 Development of Process Steam Turbines for Industry. A. D. Somes. *Mechanical Engineering,* v. 74, Apr. 1952, p. 299-308.

Numerous graphs and diagrams.

7553* Progress Report on Nuclear Power. K. H. Kingdon. *Nucleonics,* v. 10, Apr. 1952, p. 18-23.

Surveys present status of nuclear power and possibilities for the future. Considers selection of fuel, coolant, and neutron energy for civilian power reactors.

7554* Gas-Turbine Drives for Centrifugal Compressors. C. L. Moore. *Oil and Gas Journal,* v. 50, Apr. 14, 1952, p. 132, 136, 172, 174.

Describes installation and use of above at El Paso Natural Gas Co. These turbines are of the regenerative-cycle type, leading to increased economies. The principle of a second independent load shaft is utilized to provide much greater flexibility in operating conditions, with comparatively little loss in efficiency.

7555* L. D. C. Gas Turbine Runs on Coal. John I. Yellott and Peter R. Bradley. *Power Engineering,* v. 56, May 1952, p. 56-58.

At Dunkirk, N. Y., the Locomotive Development Committee's full-size locomotive gas turbine has been under test operation, burning bituminous coal, for 178 hrs. Inspection shows clean turbine rotor blades, only one very small erosion spot on one cylinder blade. Operating data are presented; equipment is diagrammed and illustrated.

7556* Efficiency of Diesel Locomotives. J. L. Koffman. *Railway Gazette,* v. 96, Apr. 11, 1952, p. 402-406.

Presents comparative efficiencies of diesel main-line units. Numerous graphs.

7557 Factors Affecting Diesel-Engine Starting. SAE *Journal,* v. 60, Apr. 1952, p. 40-44. (Excerpts from "A Summary of Seventeen Years of Diesel-Engine Starting Tests at the U. S. Naval Engineering Experiment Station", by James F. Blose.)

Discusses effects of the following factors: engine design; condition of engine parts (maintenance); fuel-injection-pump timing; storage-battery design and state of charge; properties of fuel and lubricating oils; type of cranking system; and use of special starting aids.

7558 How Gasoline Helps to Form Engine Deposits. *SAE Journal,* v. 60, May 1952, p. 39-44. (Excerpts from "The Where and Why of Engine Deposits" by R. S. Spindt and Court L. Wolfe.)

A study of the above based on results with 2-cylinder Gulf test engines equipped with Chevrolet pistons and overhead valves. Considers oil contamination; and effects of coolant temperature, oil additives, and fuel constituents. Apparatus diagram and graphs.

7559 Characteristics of Aircraft Auxiliary Turbines. *SAE Journal,* v. 60, May 1952, p. 45-48. (Excerpts from "Characteristics and Limitations of Expansion Turbines for Auxiliary Power Purposes in Turbine-Propelled Aircraft" by Homer J. Wood.)

Various design data on the above including 3-dimensional presentations.

7560 Accelerated Wear Tests For Diesel Engines. *SAE Journal*, v. 60, May 1952, p. 50-53. (Based on "Evaluation of Wear in Diesel Engines by Means of Accelerated Tests" by Robert E. Kennemer.)

A series of laboratory tests including the following types: abrasive wear tests, corrosive wear tests, and scuffing tests, performed in multicylinder engines with split set-ups used to get accurate comparative data. Graphs.

7560a Aviation Spark Plug Fouling. Part I. Its Control by Tricresyl Phosphate. *SAE Journal*, v. 60, May 1952, p. 65-70; disc., p. 71-73. (Excerpts from "Aviation Spark Plug Fouling—Its Cause and Control" by V. E. Yust and E. A. Droegemueller.)

A study on use of tricresyl phosphate to supplement ethylene dibromide as a lead scavenger. Test engine was a 4-cylinder aircraft engine operated under simulated cruise conditions. Photographs, tables, and graphs.

7561 Surging in Centrifugal and Axial-Flow Compressors. R. O. Bullock and H. B. Finger. *SAE Quarterly Transactions*, v. 6, Apr. 1952, p. 220-229.

Tendency toward high overall compressor pressure ratios in turbojet engines has imposed the problems of starting and accelerating which emphasize the need for understanding the surge phenomenon. Reviews the work done in analyzing causes of surge and in investigating the effects of compressor operating conditions on character of the flow variations that occur druing surge.

7562 Effectiveness of Amyl Nitrate in a Full-Scale Diesel Engine. M. J. Anderson and G. C. Wilson. *SAE Quarterly Transactions*, v. 6, Apr. 1952, p. 230-238; disc., p. 238-240.

Results of an investigation of amyl nitrate—an ignition accelerator—on initial combustion characteristics of fuels in full-scale diesel engines. Graphs and diagram.

7563 Humphreys Constant-Compression Engine. W. H. Paul and I. B. Humphreys. *SAE Quarterly Transactions*, v. 6, Apr. 1952, p. 259-268; disc., p. 269.

Describes the above—a conventional powerplant to which has been added a device for automatically varying the clearance volume of the combustion chamber. Graphs and illustrations.

7564 Automatic and Hydraulic Transmission. O. K. Kelley. *SAE Quarterly Transactions*, v. 6, Apr. 1952, p. 347-353; disc., p. 353-356.

Discusses the application to passenger cars, buses, cross-country military vehicles, off-the-highway equipment, and trucks, placing particular emphasis on development of satisfactory units for trucks.

Miscellaneous Publications

7565 Comparative Efficiencies of Central Station Reheat and Non-Reheat Steam Turbine-Generator Units. C. W. Elston and P. H. Knowlton. American Society of Mechanical Engineers, Paper 51-A-139, 1951, 11 pages. (TJ1 Am35p)

Comprehensive information on the above, based on results obtained in various plants since 1940. Includes graphs and diagrams.

7566 Two-Dimensional Compressible Flow in Centrifugal Compressors With Straight Blades. John D. Stanitz and Gaylord O. Ellis. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 141-163. (Technical Report 954.) (TL521 Un3r)

Six numerical examples are presented for steady, 2-dimensional, compressible, nonviscous flow in centrifugal compressors with thin straight blades. A 7th example is presented for incompressible flow. Correlation equations are developed.

7567 Application of Radial-Equilibrium Condition to Axial-Flow Compressor and Turbine Design. Chung-Hua Wu and Lincoln Wolfenstein. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 165-194. (Technical Report 955). (TL521 Un3r)

Basic general equations governing 3-dimensional compressible flow of gas through a compressor or turbine are given in terms of total enthalpy, entropy, and velocity components of the gas. Includes numerical examples.

7568 The Supersonic Axial-Flow Compressor. Arthur Kantrowitz. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 473-481. (Technical Report 974.) (TL521 Un3r)

Investigation of the possibilities of axial-flow compressors operating with supersonic velocities into the blade rows. General discussion of some of the essential aerodynamics of single-stage supersonic axial-flow compressors. An experimental single-stage supersonic compressor has been constructed and tested in Freon-12.

7569 Method of Designing Cascade Blades With Prescribed Velocity Distributions in Compressible Potential Flows. George R. Costello. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 559-569. (Technical Report 978.) (TL521 Un3r)

7570 General Algebraic Method Applied to Control Analysis of Complex Engine Types. Aaron S. Boksenbom and Richard Hood. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 581-592. (Technical Report 980.) (TL521 Un3r)

7571 Theoretical Analysis of Various Thrust-Augmentation Cycles for Turbojet Engines. Bruce T. Lundin. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 593-609. (Technical Report 981.) (TL521 Un3r)

7572 Equilibrium Operating Performance of Axial-Flow Turbojet Engines by Means of Idealized Analysis. John C. Sanders and Edward C. Chapin. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 673-684. (Technical Report 987.) (TL521 Un3r)

Method of predicting the above. Experimental correlation of theory with data from several axial-flow-type engines.

7573 Theoretical Comparison of Several Methods of Thrust Augmentation for Turbojet Engines. Eldon W. Hall and E. Clinton Wilcox. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 727-737. (Technical Report 992.) (TL521 Un3r)

7574 Analysis of Spanwise Temperature Distribution in Three Types of Air-Cooled Turbine Blade. John N. B. Livingood and W. Bryon Brown. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 753-770. (Technical Report 994.) (TL521 Un3r)

Methods for computing the above are derived for air-cooled hollow blades, air-cooled hollow blades with inserts, and air-cooled blades containing internal cooling fins. Individual and combined effects of cooling-air-temperature change due to heat transfer and rotation, radiation, and radial heat conduction were determined. An approximate method for determining allowable stress-limited blade-temperature distribution is included. Numerical examples.

7575 Theoretical Augmentation of Turbine-Propeller Engine by Compressor-Inlet Water Injection, Tail-Pipe Burning, and Their Combination. Reece V. Hensley. National Advisory Committee for Aeronautics, Technical Note 2672, Mar. 1952, 43 pages. (TL570 Un3t)

7576 Theoretical Performance of an Axial-Flow Compressor in a Gas-Turbine Engine Operating With Inlet Water Injection. Reece V. Hensley. National Advisory Committee for Aeronautics, Technical Note 2673, Mar. 1952, 25 pages. (TL570 Un3t)

The above was evaluated for normal compressor pressure ratios of 4, 8, and 16.

7577 Teoriia Gazovykh Turbin. (Theory of Gas Turbines.) Ia. I. Shnee. 386 pages. 1950. State Scientific-Technical Publishing House for Mechanical Engineering Literature, Moscow. (TJ778 S69t)

Theory and design of gas turbines and problems in selection of rational cycles of operation. Methods of calculating fundamental details of gas turbines, taking creep into consideration; and data concerning gas-turbine construction. Basic properties of axial compressors and their influence on the operation of gas turbines. Possible spheres of application and present-day installations.

21. *Prime Movers*

See also:
7646 (aviation fuels)
8079 (rocket propulsion)
8212 (heat transfer in a heated air jet)
8220 (fluid flow in turbines and jet engines)
8233 (control system for diesels)
8244 (guided-missile telemetering system)

22. CERAMICS

7578* Microporous Foam Glass. (In Russian.) I. I. Kitaigorodskii and T. N. Keshissian. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 1, 1952, p. 619-621.

A method of producing foam glass with uniform micropores was developed. The process is discussed in respect to several variables. Data are tabulated.

7579 Stabilization of Zirconia With Calcia and Magnesia. Pol Duwez, Francis Odell, and Frank H. Brown, Jr. *Journal of the American Ceramic Society*, v. 35, May 1, 1952, p. 107-113.

On the basis of the results obtained from X-ray diffraction and dilatometric measurements, information was obtained on the phase relationships in the systems zirconia-calcia and zirconia-magnesia, and some modifications to the previously published phase diagrams of these systems are proposed.

7580 A Radioisotope Study of Cobalt in Porcelain Enamel. William N. Harrison, Joseph C. Richmond, Joseph W. Pitts, and Stanley G. Benner. *Journal of the American Ceramic Society*, v. 35, May 1, 1952, p. 113-120.

A typical porcelain enamel ground coat containing a small amount of radioactive Co as oxide was prepared, applied to sandblasted enameling iron blanks, and fired under conditions selected to give underfired, normally fired, and overfired coatings, respectively. Examinations of these specimens revealed that a Co-bearing metallic deposit had been formed at the enamel-metal interface during firing, and that the enamel layer was depleted in cobalt oxide near the interface.

7581 Influence of Al_2O_3, ZnO, and K_2O on the Opacity of Fluoride-Opacified Glasses. R. J. Callow. *Journal of the American Ceramic Society*, v. 35, May 1, 1952, p. 120-122.

Despite the difference in opacity, no differences in fluorine content were detected. No support was found for the belief that Al_2O_3 is essential to the successful opacifications of a glass by means of fluorides.

7582 Experimental Refractory Bodies of High-Melting Nitrides, Carbides, and Uranium Dioxide. P. Chiotti. *Journal of the American Ceramic Society*, v. 35, May 1, 1952, p. 123-130.

A procedure for the preparation of nitrides and carbides of several metals and preparation of refractory bodies from them is described. Evidence showing the tendency of Be_3N_2, TaN, and ThN toward instability at high temperatures is presented. Evidence is also given indicating that the hexagonal structure reported by others for TaN is actually that for Ta_2N. A lattice structure for Th_2N_3 is proposed. The melting points of ThN, UN, and UC are determined.

7583 Wetting of Al_2O_3-SiO_2 Refractories by Molten Glass: I. Measurement of Wetting. J. E. Comeforo and R. K. Hursh. *Journal of the American Ceramic Society*, v. 35, May 1, 1952, p. 130-134.

Above was studied by taking measurements from enlarged photographs of a glass drop on the refractory surface after various time intervals. A review of theoretical considerations validating use of the contact angle as a means of measuring the wetting tendency is presented. The physical conditions which can influence the magnitude of the contact angle are also discussed, as is the method of calculating the contact angle. A comparison is made of the wetting behavior of the refractories studied.

7584* What's New in Glass. *Analysts Journal*, v. 8, Jan. 1952, p. 20-28.

A verbatim record of speeches presented at the Eastern Regional Conference, New York Society of Security Analysts. General topics are "Glass—A New Engineering Material", and "Glass Fibers and Glass Fertilizer."

7585* Importance of High-Temperature X-Ray Studies For Ceramic Purposes. (In German.) Gerhard Trömel. *Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleute e.V.*, v. 29, Jan. 1952, p. 2-6.

A series of examples illustrate the above. X-ray spectra and diffraction patterns. 13 ref.

7286* Some Factors Affecting the Torsion Resistance of Porcelain Enamel Specimens. George Warren. *Better Enameling*, v. 23, Apr. 1952, p. 6-10, 31.

7587* Relations and Practical Applications of Laboratory Results and Practice. D. Refractories For Coke Ovens. (In German.) Walter Mantel and Heinrich Hansen. *Brennstoff-Chemie*, v. 33, Mar. 1952, p. 69-75.

Includes photomicrographs, photomacrographs, and tables.

7588 How to Determine Insulation Needed for Furnace Walls. Part II. Maurice J. Fish. *Brick & Clay Record*, v. 120, Apr. 1952, p. 77-78, 81, 84.

Method of computation for determining the insulation required for vertical furnace walls is presented. Formulas for the calculations are developed and explained.

7589 The Elastic and Viscous Properties of Alumino-Silicate Refractories. B. A. Wiechula and A. L. Roberts. *Transactions of the British Ceramic Society*, v. 51, Mar. 1952, p. 173-197.

Commercial products covering the whole range of the alumino-silicate series were investigated. Their constitution was studied by means of X-ray analysis, differential thermal analysis, and microscopic examination of thin sections. Changes in mechanical properties at temperatures up to 1400°C. were examined. 20 ref.

7590 Observations on the Properties of Pottery Fired on Rapid Schedules in Some Types of Tunnel Ovens. W. L. German. *Transactions of the British Ceramic Society*, v. 51, Mar. 1952, p. 198-296; disc., p. 206-210.

Comparisons were made of properties of pottery fired in intermittent ovens and with more rapid schedules than usual.

7591* Plasticity. James M. Humphrys. *British Clayworker*, v. 61, Apr. 15, 1952, p. 14-17.

A discussion of the plasticity of clay. Covers such qualities as workability, range of water content over which the material exhibits workability, and base-exchange phenomena.

7592 Comparison of Some Properties of Plastic and China Tableware. John H. Koenig. *Ceramic Age*, v. 59, Apr. 1952, p. 15-18, 20-22, 24, 28-29, 64-72.

Outlines exhaustive standard tests which show the merits of china tableware as compared to plastic wares designed for similar service. According to these definite technical findings, the latter lack hardness, heat stability, and sanitation; all factors of definite importance in tableware utility. Reveals some of the shortcomings of the plastic tableware in meeting these primary requirements and the technical reasons for them. Extensively tabulated, graphed, and illustrated.

7593 Occurrence of Ferromagnetism in Spinels. R. S. Weisz. *Ceramic Age*, v. 59, Apr. 1952, p. 35-38.

Presents method and formula which allows one to estimate the extent of magnetic interaction in crystals to a useful degree of accuracy. With the aid of the formula, it is possible to rationalize Néel's assumption that in ferro-magnetic spinels the 4-coordinated metal-ion spins align antiparallel to the 6-coordinated metal-ion spins. Of the various factors affecting magnetic interactions in non-elemental solids, the importance of measuring distance from one cation through the intervening anion to the next cation is re-emphasized. This viewpoint is the foundation of the present investigation.

7594 Development and Utilization of Magnetic Ferrites. Eberhard Both. *Ceramic Age*, v. 59, Apr. 1952, p. 39-44.

Discusses work which has been done by various investigators on magnetic ferrites with respect to properties, chemical composition, and topographical arrangement of constituents. Also deals with actual and potential applications. Graphical data. 13 ref.

7595* Carbon—A Refractory and Material of Construction. *Ceramics*, v. 4, Mar. 1952, p. 7-8, 10-12, 14-15.

Discusses its advantages, preparation, forms, and applications. Gives comparative properties of British carbon and fireclay bricks.

7596* Laboratory Control in Firebrick Manufacture. W. P. Howells. *Ceramics*, v. 4, Mar. 1952, p. 21-22, 24-26.

Includes raw-materials control, control of preparation of materials and forming process, drying and firing control, and testing of finished products.

7597* Maintenance and Repairs to Refractory Brickwork. A. R. Myhill. *Ceramics*, v. 4, Mar. 1952, p. 30-36.

Discusses methods of spraying, "gunning", hot-patching with paddle, welding, and "air-borne sealing".

7598* Elevated-Temperature Fatigue-Testing Machine for Ceramic Materials. J. Dick and Ll. S. Williams. *Engineering*, v. 173, Apr. 4, 1952, p. 422-423.

Describes above machine developed in the course of an investigation of the mechanical fatigue endurance and delayed fracture properties of simple ceramics and alumina-base "cermets" (composite metal-ceramic bodies) at ordinary temperatures and elevated temperatures.

7599 Scratch-Resistance of White Enamel Covercoats. F. G. Morriss. *Foundry Trade Journal*, v. 92, Apr. 3, 1952, p. 367-370, 375.

A new method for determining the scratch-resistance of vitreous enamel is presented. Experimental results are given, and the effect of frit, clay, electrolytes, and firing conditions on scratch-resistance is discussed. Photomicrographs of the enamels examined are included.

7600 Abrasion Hardness. T. A. Jaggar. *Industrial Diamond* Review, v. 12, Mar. 1952, p. 53-56, disc., p. 57-58.

The abradability of various woods, metals, and minerals was determined with different tools under various speeds and pressures. Adopting a standard mineral as control, it was attempted to find how the order of successive degrees of softness for the same collection of substances differs under different procedures.

7601 Spalling of Fire Clay Brick. G. R. Eusner and W. S. Debenham. *Industrial Heating*, v. 19, Apr. 1952, p. 718, 722.

Briefly deals with appraisal of a group of brick by the standard spalling test according to ASTM methods, with some exceptions. Apparent porosity, bulk density, and reheat change of the brick were also determined.

7602* Basic Problems in the Production of Glass Ware. (In Russian.) I. E. Gurfinkel. *Legkaya Promyshlennost*, v. 11, Oct. 1951, p. 32-34.

Problems connected with the production of bottles and other containers.

7603 The Preparation of Laboratory Ware in Magnesia by a Modification of the Slip Casting Technique. H. T. Greenaway. *Metallurgia*, v. 45, Mar. 1952, p. 159-160.

Describes above for use in investigation of high-temperature alloys.

7604 Crystal Forms of Chromium Orthophosphate. Barbara M. Sullivan and Howard F. McMurdie. *Journal of Research of the National Bureau of Standards*, v. 48, Feb. 1952, p. 159-162.

X-ray diffraction powder patterns are given for the crystalline forms, and the general relation of chromium orthophosphate hexahydrate to other hydrates is discussed. 11 ref.

7605 Tellurite Glasses. J. E. Stanworth. *Nature*, v. 169, Apr. 5, 1952, p. 581-582.

An investigation of properties of tellurite glasses.

7606 Thermionic Constants of Graphite. K. S. Krishnan and S. C. Jain. *Nature*, v. 169, Apr. 26, 1952, p. 702-703.

Describes improved experimental technique for method based on the determination of the saturation vapor pressure of the electron gas in equilibrium with the substance at different known temperatures.

7607 Anomalous Interference Films on Glass by Chemical Treatment. F. H. Nicoll. *Journal of the Optical Society of America*, v. 42, Apr. 1952, p. 241-242.

Experimental evidence is given for the formation of films of abnormally high reflecting power, produced by chemical action on glasses of low refractive index. These films are produced by the attack of modified fluosilicic acid under controlled conditions. The results are shown to be due to the formation of double-layer films of lower refractive index than the glass and can be accounted for by the unique chemical action.

7608 High Temperature Coatings. Frederick D. Shaw. *Organic Finishing*, v. 13, Apr. 1952, p. 15-18.

Describes processes for application of ceramic or ceramic-metal types. Discusses preparation of metal and ceramic slip.

7609* Notes on Production Methods in the Scottish Firebrick Industry. R. A. Bell and J. McWilliam. *Refractories Journal*, May, 1952, p. 97-109; disc., p. 110-113.

Outlines some of the salient features of present-day production methods, the ideas behind them, and the results obtained.

7610* Uniformity of Firebrick Quality. C. E. Moore. *Refractories Journal*, Mar. 1952, p. 115-122; disc., p. 122-123.

7611* The Ternary System Na_2O—B_2O_3—SiO_2. George W. Morey. *Journal of the Society of Glass Technology*, (Transactions Section), v. 35, Dec. 1951, p. 270-283.

Presents a study of the phase-equilibrium relations in the system Na_2O–B_2O_3–SiO_2 with fields of the compounds outlined and isotherms determined. A new compound, $Na_2O \cdot B_2O_3 \cdot 2SiO_2$, has been obtained, and the conditions for its preparation and its melting point determined. Phase diagrams and tabular data.

7612* The Influence of Some Metal Ions on the Devitrification of Glasses. G. D. Rieck and J. M. Stevels. *Journal of the Society of Glass Technology* (Transactions Section), v. 35, Dec. 1951, p. 284-288.

Describes a study of the above by means of X-ray spectrometer diagram for glasses containing about 95 mole-% SiO_2 and about 5 mole-% of Li_2O, Na_2O, K_2O, BeO, MgO, CaO, BaO, or ZnO at 1200°. Tables.

7613* The Relation Between Diameter and Thermal Endurance of Glass Rods. M. D. Karkhanavala and S. R. Scholes. *Journal of the Society of Glass Technology.* (Transactions Section), v. 35, Dec. 1951, p. 289-303.

From an examination of published experimental work and results of the present investigation, a general relationship is deduced between thermal endurance, physical properties, and radius of a glass rod. Graphs, apparatus diagram, tables, and 34 ref.

7614* The Relations of Thermal Expansion, Composition and Structure of Glasses. I. The Sodium Oxide-Silica Glasses. Henry H. Blau. *Journal of the Society of Glass Technology.* (Transactions Section), v. 35, Dec. 1951, p. 304-317.

Derives a new equation for calculating thermal-expansion coefficients from glass compositions. Graphs, tables, and 34 ref.

7615* The Fracture Velocity of a Glass at Liquid Hydrogen Temperatures. Henry M. Dimmick. *Journal of the Society of Glass Technology* (Transactions Section), v. 35, Dec. 1951, p. 318-319.

For a soda-lime-silica glass the above was found to be 1542 m./sec. Temperature coefficient of fracture velocity is approximately −0.15 m./sec./°K. over the range 77-475°K.

7616* A Method of Determining the Viscosity of Highly Viscous Materials. Finn Gronlund. *Journal of the Society of Glass Technology* (Transactions Section), v. 35, Dec. 1951, p. 320-331.

Circular rods of highly-viscous resins were used. Good agreement was found between experimental results and a theoretically derived formula. Method may prove suitable for application to glasses. Tables, graphs, photographs, and 16 ref.

7617* The Colour of Iron-Containing Glasses of Varying Composition. Gordon F. Brewster and Norbert J. Kreidl.

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Journal of the Society of Glass Technology (Transactions Section), v. 35, Dec. 1951, p. 332-406.

Color changes caused by systematic composition variations in Fe-containing silicate and silica-free glasses were evaluated in terms of visual color, spectral transmission, and chromaticity. Data may be applied to development and control of commercial or novel colored glasses, and in the quantitative interpretation of constitution. Numerous tables and graphs. 25 ref.

7618* A Note on Arsenic Glasses. A. E. Badger and D. E. Sharp. *Journal of the Society of Glass Technology* (Transactions Section), v. 35, Dec. 1951, p. 407-410.

Brief survey of possibilities of glass formation in a restricted part of the potash-lead oxide-alumina-arsenic and of the potash-barium oxide-alumina-arsenic fields. Presents chemical compositions and physical properties of 2 glasses.

7619* On the Structure of Glass. Adolph G. Smekal. *Journal of the Society of Glass Technology* (Transactions Section), v. 35, Dec. 1951, p. 411-420.

Analyzes general conditions for formation of glasses, considered as polymer states with rigid irregular frameworks. Considers such topics as bonding condition, irregularly restriction, coordination and atom-bridging conditions, and prediction of glass-formers. 24 ref.

7620* The Significance of the Co-ordination Requirements of the Cations in the Constitution of Glass. I. Basic Concepts and the Constitution of Alkali Silicate Glasses. II. The Effect of Temperature and Composition on Oxidation—Reduction Equilibria in Glasses. III. The Chemical Durability of Glasses. IV. The Atomistic Interpretation of the Melting of Binary Compounds and of the Formation of Eutectic Melts. W. A. Weyl. *Journal of the Society of Glass Technology* (Transactions Section), v. 35, Dec. 1951, p. 421-486.

Part I shows need for revision in present approach to constitution of glasses. Taking deformations of O^{--}ions into consideration, the network theory is modified by considering binding forces between ions. Part II considers there is no basic difference between oxidation-reduction processes in glasses and slags on the one hand and those in aqueous solutions on the other. Examples are given. Discusses meaning of terms acidity and basicity applied to glasses and slags in relation to screening requirements of ions present. Part III shows reactions between a glass and H_2O can be explained on basis of co-ordination requirements of the Si ion and its dependence on polarizability of surrounding O^{--}ions. Explanations are offered of contraction during formation of Vycor glass; of action of alkaline solutions on glass; and of results of Dimbleby and Turner's work on effect of different ions on resistance of glasses to attack by water. Part IV, as a preliminary to studying problems of melting of glasses and viscosity of the melted material, discusses at length cases of simple compounds possessing a crystalline structure, such as the metallic halides and in particular, NaCl. Considers problems of structural changes during melting of NaCl; influence on melting point of polarizability of cation, and of anion-to-cation ratio; latent heat of fusion; thermal expansion of fused salts; and formation of eutectic melts. Tables, diagrams, and 57 ref.

7621* The Use of Wire Resistance Strain Gauges and a Polarising Microscope to Determine Permanent Stresses in Tempered Glass. I. L. Resnick and R. E. Mould. *Journal of the Society of Glass Technology.* (Transactions Section), v. 35, Dec. 1951, p. 487-489.

Briefly describes combination technique involving the use of minute strain-gages cemented to the intact article, cutting up the article, reading the strain-gage information, and finally examining the dissected article in the polariscope.

7622* A New Approach to the Study of the Viscosity of Glass in and Below the Annealing Range. G. M. Blaimont, J. R. G. DeBast, P. G. Migeotte, and H. P. C. Vandecapelle. *Journal of the Society of Glass Technology* (Transactions Section), v. 35, Dec. 1951, p. 490-496.

Describes apparatus for determination of viscosity and flow characteristics, under known loads, of specimens of glass of fairly large size at temperatures below softening point. Results given for range 400-525°. Apparatus diagrams. 18 ref.

7623* Synthesising Polariscopic Strain-Patterns. F. W. Preston. *Journal of the Society of Glass Technology* (Transactions Section), v. 35, Dec. 1951, p. 497-505.

Mathematical analysis of degree of briefringence (and resultant polariscopic appearance) produced at a point in the wall near the top of a simple cylindrical thin-walled container. Diagrams.

7624* Hairline Cracks in Glazes on Porous Ceramic Products. (In German.) W. Kerstan. *Sprechsaal für Keramik; Glas; Email,* v. 85, Apr. 5, 1952, p. 139-141.

Discusses methods for preventing the above. A ternary diagram shows clay-feldspar silica compositions likely and unlikely to crack. (To be continued.)

7625* Importance of the Refractory Clay Grain Structure in the Production of Economical Sagger Masses. (In German.) Siegfried Goller and Herwart Metzel. *Sprechsaal für Keramik; Glas; Email,* v. 85, Apr. 5, 1952, p. 141-144.

Discusses the importance of grain size for above purpose, also different methods of classifying grain size. Graphs and tables. 14 ref. (To be concluded.)

7626* Development of and Experiences with Basic Chrome Ore—Magnesite Roofs for Large Tilting Furnaces. (In German.) Werner Lange. *Stahl und Eisen,* v. 72, Mar. 13, 1952, p. 284-287; disc., p. 287.

Describes experiences with the above in 120-150 ton furnaces from 1941 to date. Discusses suspension of the roof bricks; heating-up schedules; temperature measurement; fuel consumption and its relationship to proportion of hot pig iron charged; cost comparison between silica and chrome ore—magnesite roofs (latter cheaper); and metallurgical advantages.

7627* The Manufacture of Blast-Furnace-Slag Wool Without Refusion. (In German.) Gerhard Naeser and Peter Dickens. *Stahl und Eisen,* v. 72, Mar. 13, 1952, p. 297-301; disc., p. 301-302.

Gives details of process developed, pointing out advantages over previous methods. Graphs, diagrams, and tables.

7628* Use of Dolomite Bricks in the Electric-Arc Furnace When Refining With Oxygen. (In German.) Harro Werwch. *Stahl und Eisen,* v. 72, Mar. 27, 1952, p. 341-345; disc., p. 345.

Application of the oxygen lance for refining when melting-down scrap. High wear of the furnace lining in the melting of stainless steel having a carbon content of less than 0.1%, from scrap of predominantly high alloy content. Drawbacks of the tar-dolomite hearth. Failure of the hard hearth. Advantages of dolomite brick-walled hearths. Dolomite mortar with a special oil binder. Experiences with experimental walls.

7629* The Use of Alkaline Slags for the Refining of Glass. (In Russian.) M. I. Nekrich and I. V. Borovikov. *Steklo i Keramika,* v. 8, Sept. 1951, p. 10.

The above is compared to the use of slag in steelmaking. The use of basic slag is expected to reduce the unit cost of glass articles.

7630* Investigation of Furnaces for the Production of Foam Glass. (In Russian.) L. B. Ginzburg and N. I. Fateeva. *Steklo i Keramika,* v. 8, Sept. 1951, p. 11-13.

Heat balances were determined for above furnaces. Tables and graphs.

7631* Alumina Trihydrate as a Raw Material for Producing Refractory-Ceramic Articles. (In Russian.) V. A. Rybnikov and N. V. Gruzdeva. *Steklo i Keramika,* v. 8, Oct. 1951, p. 14-16.

Discusses use of the above and the influence of several manufacturing variables on the properties of hydromullite and hydrocorundum. Tables.

7632* Fireclay-Base Porous Ceramics From Alkaline-Silicate Batches. (In Russian.) K. A. Smirnova. *Steklo i Keramika,* v. 8, Oct. 1951, p. 16-18.

The influence of grain size and other variables on porosity and strength of ceramic articles was investigated. Data are charted and discussed.

7633* Experiments and Theories on the Strength Factor of Glass as a Function of Its Composition. III. (In French.) J. M. Stevels. *Verres et Refractaires*, v. 6, Jan.-Feb. 1952, p. 3-7.

The above was investigated for various compositions in the M_2O-B_2O_3-SiO_2 system (M representing Li, Na, or K). Tables and graphs.

7634* The Condition and Properties of Silica in Silicate Glasses. (In Russian.) A. A. Appen. *Zhurnal Prikladnoi Khimii*, v. 24, Sept. 1951, p. 904-914.

Discusses the above and predicts the properties of glass as a function of molar content of SiO_2. Data are tabulated and charted.

7635* Ternary Diagrams for Portland Cement. (In Russian.) A. I. Minas. *Zhurnal Prikladnoi Khimii*, v. 24, Sept. 1951, p. 940-944.

Sections of the CaO-SiO_2-Al_2O_3 and SiO_2-Al_2O_3-Fe_2O_3 diagrams are discussed in their relation to Portland cement. Tables and graphs.

7636* Behavior and Properties of Oxides of the Alkaline Metals in Silicate Glasses. (In Russian.) A. A. Appen. *Zhurnal Prikladnoi Khimii*, v. 24, Oct. 1951, p. 1001-1009.

Tables and graphs. 10 ref.

Miscellaneous Publications

7637 Refractory Practice as Applied to Malleable Duplexing. C. W. Meyer. American Foundrymen's Society, Preprint 52-24, 1952, 7 pages. (TS200 Am35t)

Improvements made in the refractory practice by experimenting with various types of tuyeres and melting-zone linings is discussed. The forehearth, transfer ladle, and electric furnace are described as to their design and length of life as determined by the different refractories used.

7638 Air Furnace Refractory Practice in Cupola-Air Furnace Duplexing. William C. Corbeau. American Foundrymen's Society, Preprint 52-27, 1952, 3 pages. (TS200 Am35t)

At Cleveland Works, National Malleable & Steel Castings Co., Cleveland.

7639 Preliminary Report on Coated Lightweight Concrete Aggregate From Canadian Clays and Shales. Part 1. Alberta. J. G. Matthews. Mines Branch, Canada Department of Mines and Technical Surveys, Memorandum Series 117, Feb. 1952, 67 pages. (TN41 C16m)

Contains results of test work on samples from what are considered the most important known deposits within a marketable distance of well-populated areas. The aim of the laboratory work was to produce the highest grade of aggregate, namely a coated aggregate, at the lowest cost by using the raw materials in their natural state.

7640 Studies in Cement-Aggregate Reaction. IX. Some Observations on Mortar Containing Reacting Aggregate. R. H. Jones and H. E. Vivian. **X. The Effect on Mortar Expansion of Amount of Reactive Component in the Aggregate. XI. The Effect on Mortar Expansion of Amount of Available Water in Mortar. XII. The Effect of Amount of Added Alkalis on Mortar Expansion. XIII. The Effect of Added Sodium Hydroxide on the Tensile Strength of Mortar. XIV. The Effect of Small Amounts of Reactive Component in the Aggregate on the Tensile Strength of Mortar. XV. The Reaction Product of Alkalis and Opal.** H. E. Vivian. Commonwealth Scientific and Industrial Research Organization, Bulletin 256, 1950, 78 pages. (T177 A78b)

7641 The Interpretation of Broadened X-Ray Reflections With Special Reference to Clay Minerals. G. W. Brindley. *Discussions of the Faraday Society*, no. 11, 1951, p. 75-82. (TK1 F22d)

49 references.

7642 The Preparation of Crucibles from Nitrides. L. S. Foster. U. S. Atomic Energy Commission, AECD-2942, July 1945, 60 pages. (UF767 Un3m)

Methods developed for manufacturing TiN and ZrN consists of first forming the corresponding hydride and then converting it to the nitride by reaction with ammonia. Crucibles were made by standard ceramic techniques and fired in high-temperature induction furnaces. Hydrostatic pressing gave crucibles with very low porosities. Boron nitride showed promise as a crucible material and as an insulating material for the construction of high-temperature furnaces. Fe and Ce could be melted in nitride crucibles with appreciable contamination, but Be could not. Diagrams, tables, and graphs. 39 ref.

Books

7643 Die physikalischen und chemischen Grundlagen der Keramik. (The Physical and Chemical Principles of Ceramics.) Ed. 2. Hermann Salmang. 310 pages. 1951. Springer-Verlag, Berlin, Germany. (TP807 Sa35p2)

Discusses comprehensively the chemistry, physics, and properties of clays, silica, feldspar, glazes, tiles, refractory materials, terra cotta, stoneware, porcelain, and electrical insulating materials. Diagrams, graphs, tables, photographs, and numerous references.

See also:
6861 (steelmaking refractories)
6926 (glass tools for forming metals)
6948 (new type of corundum abrasive)
7059 (refractory coatings)
7062 (ceramic coatings for jet engines)
7076 (vitreous enameling of castings)
7398 (growing single crystals of refractory compounds)
7760 (thermodynamic properties of meta-titanates)
7822 (specific heat of Ba TiO_3)
8149 (Pb-Ba) ZrO_3 and related systems)
8152 (thermal conductivities of carbons and graphite)
8275 (ceramics as capacitors)
8340 (carbon and graphite materials and parts)
8343 (new French glass-technology research center)
8346 (history of abrasives industry)

23. LUBRICATION AND FRICTION

7644* Oil Flow in Plain Journal Bearings. *Diesel Power*, v. 30, Apr. 1952, p. 97, 135.

Describes work carried on by the National Bureau of Standards in conjunction with the National Advisory Committee of Aeronautics on the above.

7645* The Nature of Soap-Thickened Lubricating Greases. Marjorie J. Vold and Robert D. Vold. *Journal of the Institute of Petroleum*, v. 28, Mar. 1952, p. 155-163.

An investigation of the structure of the above. Phase diagrams were determined for Ca stearate and its hydrate, and for Li stearate, in cetane and in decalin, and for the system Na stearate-cetane. Phase diagram, graphs, and electron micographs. 22 ref.

7646* The Aviation Industry. *Lubrication*, v. 38, Apr. 1952, p. 37-52.

A survey of petroleum-industry contributions to the technical advancement and growth of various phases of aviation. Some of the more significant developments in fuels and lubricants are presented. Includes such topics as gas-turbine, specialized air-frame, and accessory lubricants; and reciprocating, gas-turbine, and jet fuels. Tables, photographs, and graphs.

7647 Low-Temperature Lubrication of Aircraft Engines. Saul Barron. *SAE Quarterly Transactions*, v. 6, Apr. 1952, p. 175-194; disc., p. 194-195.

Investigations of the lubrication of both reciprocating and turbojet aircraft engines are reported. Numerous graphs. 11 ref.

Miscellaneous Publications

7648 Solid Phase Structure in Lubricating Grease. E. W. J. Mardles and I. E. Puddington. *Discussions of the Faraday Society*, no. 11, 1951, p. 43-47. (TK1 F22d)

Discusses the above for different types.

7649 Friction and Wear. J. Pomey. National Advisory Committee for Aeronautics, Technical Memorandum 1318, Mar. 1952, 108 pages. (Translated form Office National d'Études et de Recherches Aeronautiques, Rapport Technique No. 36, 1948.) (TL570 Un3tm)

Consists of 5 chapters: General Remarks on Friction and

23. *Lubrication and Friction*

Wear; Hydrodynamic Lubrication; Greasy (Boundary) Friction; Seizure; and Dry Friction. Includes discussion of bearing-metal factors.

Books

7650 Performance of Lubricating Oils. H. H. Zuidema. 179 pages. 1951. Reinhold Publishing Corp., New York. (TJ1075 Z84p)

This book, containing numerous charts, tables, and illustrations, summarizes and evaluates available data on performance characteristics of lubricating oils under various conditions. The subject is approached from the point of view of performance, rather than specific application. Chapters are devoted to such topics as the lubrication process, flow characteristics, sludge and lacquer deposition, bearing corrosion, emulsification and foaming, viscosity, pour point, and extreme-pressure lubrication. A chapter on manufacturing methods is designed to point out the effects of each step in the manufacturing process upon the performance characteristics of the final product.

See also:
6886 (fluid for die-casting machines)
7548 (lubricant additives—bibliography)

24. DESIGN

7651* The Problem of the Mechanism of Deformation of Cylindrical Helical Springs With Circular Cross Section and Low Pitch. (In Russian.) M. E. Berman. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 11, 1952, p. 689-691.

Presents a theoretical treatment of the stress-strain relations in coil springs.

7652 How Sperry Harnesses the Electron. E. J. Tangerman. *American Machinist*, v. 96, Apr. 14, 1952, p. 143-154.

Special report on wire-preparation, cable, and harness-assembly departments of Sperry Gyroscope Co. Layout, production, planning, and methods engineering are described and illustrated.

7653 Materials in Airframe Construction. H. H. Grover and S. A. Gordon. *Battelle Technical Review*, v. 1, Apr. 1952, p. 36-39.

Surveys the above, including World War II developments. Table lists a few of the different materials currently in use in airframe construction and shows approximate values of some strength properties of each. A simple example illustrates the relationship of material properties to design configuration. General trends are discussed.

7654* Design of Multi-Part High-Pressure Vessels, Particularly Multi-Unit Types. (In German.) J. Class and A. F. Maier. *Chemie-Ingenieur-Technik*, v. 24, Apr. 1952, p. 184-198.

Reviews German practice in the above where the principal types have been of "wrapped" or "wound" construction. Schematic diagrams, tables, and graphs. 69 ref.

7655* Stress Relationships of "Wrapped" Vessels. (In German.) E. Siebel and S. Schwaigerer. *Chemie-Ingenieur-Technik*, v. 24, Apr. 1952, p. 199-203.

Theory and practice of acceptance tests for the above used for high pressures. Calculations, diagrams, and graphs.

7656* Elasto-Plastic Stresses in Transversely-Loaded Beams. Jacques Heyman. *Engineering*, v. 173, Mar. 21, 1952, p. 359-361; Mar. 28, 1952, p. 389-390.

Presents mathematical analysis of the above. Results are shown in tables.

7657* Synthesis of Two-Dimensional Joint Gears. (In German.) G. Kiper. VDI Forschungsheft 433 (Supplement to *Forschung auf dem Gebiete des Ingenieurwesens*, ser. B, v. 18, 1952), 36 pages.

There is said to be a tendency to replace crank gears by joint gears which, generally, are cheaper, more efficient, and capable and higher speeds. At present, only 2-dimensional, 4-joint gears can, as a rule, be predesigned satisfactory for up to 5 required positions of drive and take off. In this report, new basic methods are developed and explained by means of examples for the design of joint gears with a larger number of positions between drive and take off. Numerous diagrams. 84 ref.

7658* Method of Compound Gearing Calculation. R. A. Kraus. *Machinery*, (London), v. 80, Apr. 10, 1952, p. 641-643.

A simplified method for use with the Lancaster chart. A copy of the latter is included.

7659* On the Solution of a Circular Plate of Non-Uniform Thickness. (In English.) Masao Naruoka. *Memoirs of the Faculty of Engineering* (Kyoto University), v. 14, Jan. 1952, p. 1-11.

A method giving an approximate solution is explained by application of a formula analogous to that of the slope-deflection method used in the solution of rigid frames to the case where a symmetrical load is applied to a circular plate whose thickness is a function only of the radial distance.

7660* Stability of Plane Bending Beyond the Elastic Limit (Influence of Hardening.) (In Russian.) L. M. Kachanov. *Prikladnaia Matematika i Mekhanika*, v. 15, Sept.-Oct. 1951, p. 637-641.

7661 Key Factors in Selecting Needle Bearings. P. R. Glazier. *Product Engineering*, v. 23, Apr. 1952, p. 123-128.

Includes tabular data, schematic and cut-away digrams.

7662 Designing Springs for Precision Measurement. M. G. Fangemann. *Product Engineering*, v. 23, Apr. 1952, p. 152-155.

In addition to the physical factors that govern the reactions of spring materials to varying service conditions, other design factors such as coil construction, calibrator design, and space considerations are discussed. Diagrams, graphs, and illustrations.

7663 Objectives in Industrial Design. *Product Engineering*, v. 23, Apr. 1952, p. 171-178.

Refers to appearance design. While sense of perspective, taste, and drafting ability are required, these talents are subject to restrictions. What these restrictions are and how they can be met are brought out by studies of successful products. Illustrated.

7664 Characteristics of Propellers for Turboprop Airplanes. Joseph M. Mergen and Jack Kâsley. *SAE Quarterly Transactions*, v. 6, Apr. 1952, p. 332-346.

In the main part, the material is presented from the propeller viewpoint; however, considerable attention is devoted to specific propeller functions and structural items that stem directly from engine and airplane requirements.

7665* Buckling of Straight Bars Under Torsion. (In German.) Hans Ziegler. *Zeitschrift für angewandte Mathematik und Physik*, v. 3, Mar. 15, 1952, p. 96-119.

Mathematical analysis and diagrammatic clarification. 14 ref.

Miscellaneous Publications

7666 Dynamic Capacity of Roller Bearings. (In English.) G. Lundberg and A. Palmgren. *Acta Polytechnica* (Mechanical Engineering Series), v. 2, no. 4, 1951, 32 pages. (T1 Ac81)

The theory for roller bearings is extended, based on new experience. A special chapter treats "equivalent" load for roller bearings.

7667 Comparative Costs and Operation of Carbide Tipped Saws. Claude E. Drake. American Society of Mechanical Engineers, Paper 51-A-121, 1951, 11 pages. (TJ1 Am35p)

Outlines factors involved in efficient and economical operation and maintenance of carbide-tipped saws. Gives certain fundamentals of new design, which are related to efficient saw operation and maintenance.

7668 A Technique Applicable to the Aerodynamic Design of Inducer-Type Multistage Axial-Flow Compressors. Melvyn Savage and Loren A. Beatty. National Advisory Committee for Aeronautics, Technical Note 2598, Mar. 1952, 62 pages. (TL570 Un3t)

A method is presented for the above using the solid-body inducer-type design. A chart which facilitates preliminary design calculations for any solid-body inducer-type design is presented. Typical preliminary design calculations are presented for a range of pertinent factors.

7669 Interaction of Column and Local Buckling in Compression Members. P. P. Bijlaard and G. P. Fisher. National Advisory Committee for Aeronautics, Technical Note 2640, Mar. 1952, 110 pages. (TL570 Un3t)

Tests were carried out for a considerable range of ratios of corrected free lengths to radius of gyration on two sections, for one of which the local buckling stress was in the plastic domain, and for the other, in the elastic domain. The experimental buckling stresses are in excellent agreement with those predicted by theory. 21 ref.

7670 Investigation of Stress Distribution in Rectangular Plates With Longitudinal Stiffeners Under Axial Compression After Buckling. Chi-Teh Wang and Harry Zuckerberg. National Advisory Committee for Aeronautics, Technical Note 2671, Mar. 1952, 59 pages. (TL570 Un3t)

Mathematical analysis and graphical interpretation. Comparison with experimental data.

7671 The Stability Under Longitudinal Compression of Flat Symmetric Corrugated-Core Sandwich Plates With Simply Supported Loaded Edges and Simply Supported or Clamped Unloaded Edges. Paul Seide. National Advisory Committee for Aeronautics, Technical Note 2679, Apr. 1952, 27 pages. (TL570 Un3t)

Mathematical analysis and graphical interpretation.

7672 Direct Method of Design and Stress Analysis of Rotating Disks With Temperature Gradient. S. S. Manson. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 103-116. (Technical Report 952) (TL521 Un3r)

7673 Small Bending and Stretching of Sandwich-Type Sheels. Eric Reissner. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 483-508. (Technical Report 975.) TL521 Un3r)

Theory developed for the above. General results were applied to solution of problems concerning flat plates, circular rings, circular cylindrical shells, and spherical shells. Numerical examples. 10 ref.

7674 Critical Stress of Ring-Stiffened Cylinders in Torsion. Manuel Stein, J. Lyell Sanders, Jr., and Harold Crate. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 693-699. (Technical Report 989.) (TL521 Un3r)

Chart in terms of nondimensional parameters. Comparison of theoretical with experimental results.

Books

7675 Technical Drawing. Frederick E. Giesecke, Alva Mitchell, and Henry Cecil Spencer. 851 pages. 1952. MacMillan Co., New York. (T353 G36t3)

A class text and reference book in technical drawing. Contains a very large number of problems covering every phase of the subject. Numerous drawings.

7676 Mechanics. Part I. Statics. J. L. Meriam. 340 pages. 1952. John Wiley & Sons, New York. (QA805 M54m)

The first of two volumes covering basic engineering mechanics; integrates the usual pre-engineering background of physics, mathematics, and graphics. Progresses in easy stages from fundamentals to advanced theory; emphasizes the importance of principles and problems which apply them. Presents 672 practical problems. Answers are given for more than half of these problems, and all are profusely illustrated.

See also:

7010 (design for metal wire stitching)
7022 (design of brazed joints)
7182 (application of creep data to design)
7219 (elastic stability of bent I-beams)
7220 (gear design)
7237 (buckling of sandwich plates)
7542 (design for noise control of jet engines)
7550 (motor design)
8079 (aeronautical design)
8274 (printed-circuit design and assembly)
8358 (aircraft design)

25. CHEMICAL TECHNOLOGY

7677* Packing of Earth Media and Filtration With Variable Porosity Taking Into Account the Influence of Combined Water. (In Russian.) V. A. Florin. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Nov. 1951, p. 1625-1649.

Presents details of extensive theoretical and experimental investigation. Graphs, diagrams, and calculations. 10 ref.

7678* Pigment Deficiencies. *American Ink Maker*, v. 30, Apr. 1952, p. 27-29, 63, 65.

Detailed discussion of the above as it applies to printing inks.

7679* Some Aspects of Ink Grade Carbon Blacks. J. Drogin. *American Ink Maker*, v. 30, Apr. 1952, p. 30-36, 65, 67.

Discusses manufacture, properties, applications, sales, and comparison of grades.

7680 How to Make Chemicals From Coal. Hydrogenation: Union Carbide Makes A Bet. *Business Week*, May 10, 1952, p. 106-108, 110, 112.

Discusses processes and possibilities with respect to making chemicals from coal. Carbide & Carbon Chemicals Co. has built an $11-million plant at Institute, W. Va., near Charleston. They take a lump of soft coal, ram hydrogen into it, raise the temperature to 900°F. and the pressure to 4, and distill the resulting liquid. From this they get a synthetic liquid fuel or any of various coal chemicals that you can't get from other processes.

7681 Cost and Performance of Centrifugals. Julian C. Smith. *Chemical Engineering*, v. 59, Apr. 1952, p. 140-142, 147.

Current information on purchase prices, installation costs, operating labor and maintenance, and performance and capacity figures. Tables and graphs.

7682 Statistics Can Put More Meaning Into Your Cost Estimates. Paul Ferencz. *Chemical Engineering*, v. 59, Apr. 1952, p. 143-147.

Detailed examples on the above showing how to calculate probable accuracy of the estimate. Such topics as acceptable risk, comparison of competing processes, investment, annual costs, and profit.

7683 What Goes on Inside Bubble-Cap Towers? Frederick Z. Zenz. *Chemical Engineering*, v. 59, Apr. 1952, p. 169-173.

Gives graphical solution diagrams for vapor capacity of bubble-cap trays, tower diameters, and liquid gradient across the tray. Considers tray spacing, slot submergence, and slot opening.

7684 Centrifugal Disk Atomization. S. J. Friedman, F. A. Gluckert, and W. R. Marshall, Jr. *Chemical Engineering Progress* (Engineering Section), v. 48, Apr. 1952, p. 181-191; disc., p. 191.

Presents study of power consumption, drop size, drop-size distribution, and trajectory from a number of typical centrifugal disks operating over a wide range of conditions. Correlations developed which permit drop size and distribution from spray disks and power consumed by these disks to be predicted. Relationships proposed are in general agreement with data of other investigators. Apparatus diagrams, graphs, and tables. 36 ref.

7685 The Application of Radioactive Tracers to Diffusional Operations. Binary and Tenary Equilibrium Data. H. E. Hughes and J. O. Maloney. *Chemical Engineering Progress* (Engineering Section), v. 48, Apr. 1952, p. 192-200.

Discusses investigations using carbon-14. Two types of a new counter were developed, one for use upon static samples, and one capable of continuously monitoring a liquid stream. A modified Othmer still was used to obtain vapor-liquid equilibrium data using methanol tagged by carbon-14. The system methanol-n-butanol-water was studied at 30°C. and at a pressure of one atm.; radioactive methanol counts and density determinations were used for sample analyses. Complete component-distribution and solubility data were obtained. Apparatus and solubility diagrams, photographs, tables, and graphs. 17 ref.

25. *Chemical Technology*

7686* Further Development of the Fluidized Separator. (In German.) H. Rumpf and F. Kaiser. *Chemie-Ingenieur-Technik*, v. 24, Mar. 1952, p. 129-135.

By introduction of rotating fluidized space separating walls, the fluidized separator developed by the Badische Anilin- & Soda-Fabrik of Ludwigshaven has been developed into a coarse material scavenger which automatically adapts itself to the separation boundary. During the development, new information concerning the definition of grain size and the depositing action of fine dusts was obtained.

7687* Use of the Heat Pump in Rectification. (In German.) W. Dressel. *Chemie-Ingenieur-Technik*, v. 24, Mar. 1952, p. 149-153.

Performance figures and operating data for the rectification of binary mixtures using a heat pump are calculated on the basis of examples. A diagram is developed from which a comparison of the economics of a process with and without a heat pump can be determined.

7688* Composition and Transformation of Tar Hydrocarbons From Low-Temperature Distillation of Coal. (In German.) Walter Fuchs and K. A. Hamacher. *Erdöl und Kohle*, v. 5, Jan.-Feb. 1952, p. 80-83.

Surveys literature on composition of above tar and on classification of its hydrocarbon components; describes Kattwinkel's modified method for tar oils; explains formation and pyrolysis of tar, and discusses thermodynamic computations on unstable tar components. Graphs and tables. 20 ref.

7689* Vacuum-Distillation Plants for Crude Oils. Recent Developments in the U. S. A.; Comparison With European Designs. (In German.) E. Reisemann. *Erdöl und Kohle*, v. 5, Mar. 1952, p. 161-167.

7690* Crude Gas to Finished Product. 9. The Application of Liquid Purification Technique. *Gas Times*, v. 70, Mar. 21, 1952, p. 417-418.

Describes and discusses types of purification processes.

7691 The Sindri Fertilizer Factory. *Industrial Chemist and Chemical Manufacturer*, v. 28, Apr. 1952, p. 161-169.

Construction and operation. Has capacity of 350,000 tons of $(NH_4)_2SO_4$ annually. Flow diagrams and photographs.

7692 Hydrogen Fluoride Extraction of High-Sulfur Virgin Petroleum Stocks. A. P. Lien and B. L. Evering. *Industrial and Engineering Chemistry*, v. 44, Apr. 1952, p. 874-879.

Describes results of treating a wide variety of petroleum stocks with HF, develops the effects of a number of variables, and interprets the results obtained on refinery stocks in the light of the previously discussed chemistry of HF extraction. 14 ref.

7693 Propane Deasphalted Gas Oil as Catalytic Cracking Feed Stock; Cracking Over a Mixture of Natural and Synthetic Catalysts. E. Clarence Oden and Thomas S. Granberry. *Industrial and Engineering Chemistry*, v. 44, Apr. 1952, p. 896-902.

Flow diagrams, graphs, and tables.

7694 Phosphorus Pentoxide Reversion of Ammoniated Superphosphate; Some Effects of Fluorine. R. C. Datin, E. A. Worthington, and G. L. Poudrier. *Industrial and Engineering Chemistry*, v. 44, Apr. 1952, p. 903-905.

Experimental equipment for superhosphate manufacture is described and diagrammed; data are charted and tabulated. 18 ref.

7695 Methods for Treating Data From Multiplate Equilibrium Stills. T. M. Reed, III, and H. S. Myers. *Industrial and Engineering Chemistry*, v. 44, Apr. 1952, p. 914-916.

Two graphical methods are discussed whereby multiplate equilibrium data may be translated into the original equilibrium diagram. One method requires that samples be taken at 3 different plates, each separated from the other by one or more equilibrium plates. The 2nd method requires 2 sample points and at least one known point on the conventional equilibrium curve. These methods allow an accurate value of the relative volatility to be assigned to any intermediate composition existing between the particular sample-point compositions.

7696 Wetted-Wall Tube-Plate Column; A Gas-Liquid Contactor. Joseph J. Martin. *Industrial and Engineering Chemistry*, v. 44, Apr. 1952, p. 920-924.

It was felt that the conventional bubble-cap and packed columns used in industry might be improved if their better features could be incorporated into one column. Results indicate that a column of the new design might be a better gas-liquid contactor than those in use at present. The results, however, are not conclusive, and the necessary lines of research to be undertaken to prove any superiority are indicated. Diagrams, graphs, tables, and illustrations.

7697* Classification of Bitumens in Asphalt Technology by Certain Rheological Properties. Part I. The Use of Viscosity and Consistency Tests in the Classification of Asphaltic Bitumens: A Critical Survey of Existing Knowledge. S. L. Neppe. *Journal of the Institute of Petroleum*, v. 28, Mar. 1952, p. 109-154.

120 references.

7698* Studies in Shale Oil. Part III. Some Constituents of Shale Naphtha. Geo. E. Mapstone, J. S. Durham, and H. D. Taskis. **Part IV. The Sulphochlorination of a Selected Shale Oil Fraction.** G. Nottes and Geo. E. Mapstone. **Part V. Aldehyde Resins From Shale Tar Bases. Part VI. A Note on the Discoloration of Cracked Shale Gasoline.** Geo. E. Mapstone. *Journal of the Institute of Petroleum*, v. 28, Mar. 1952, p. 172-192.

Tables. 52 ref.

7699 Equilibrium Vaporization Ratios for Nitrogen, Methane, Carbon Dioxide, Ethane and Hydrogen Sulfide in Absorber Oil—Natural Gas and Crude Oil—Natural Gas Systems. R. H. Jacoby and M. J. Rzasa. *Journal of Petroleum Technology*, v. 4, Apr. 1952, *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 195, 1952, p. 99-110; disc., p. 110.

Experimental equilibrium vaporization ratios (K values) were obtained for N, CH_4, CO_2, C_2H_6, and H_2S in 2 natural gas-absorber oil mixtures and in 2 natural gas-Elk basin crude oil mixtures. For each mixture of constant over-all composition, data were obtained at 100, 150, and 200°F. and at various pressures in the range 200-5000 psia. Some effects of composition on K values were obtained to serve as a guide in choosing K's for engineering calculations on other mixtures. Describes new-type pressure cell. Photographs, flow sheet, graphs, and tables.

7700* Analytical and Pharmacological Problems Arising From the Use of Organic Chemicals as Processing Aids and Hygiene Aids in the Food Industry. J. B. M. Coppock. *Journal of the Science of Food and Agriculture*, v. 3, Mar. 1952, p. 115-122.

The term "processing aid" is restricted to organic chemicals directly associated with operation of plant equipment in food processing; examples are use of mineral oils as lubricants, thermostable silicon resins as alternatives to tin greases in bread production, and plastics as materials of construction. "Hygiene aids" include insecticides, rodenticides, fungicides, detergents, and wrapping materials used for the protection of food products. 21 ref.

7701* Manufacture of Algal Chemicals. IV. Laboratory-Scale Isolation of Fucoidin From Brown Marine Algae. W. A. P. Black, E. T. Dewar, and F. N. Woodward. *Journal of the Science of Food and Agriculture*, v. 3, Mar. 1952, p. 122-129.

18 references.

7702 Chemicals From Coal Hydrogenation. E. E. Donath. *Mining Engineering*, v. 4, Apr. 1952; *Tranactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 381-385.

Discusses in detail possibilities of the coal-hydrogenation process as a source of chemical raw materials. Main steps of the process, and the product streams used for the recovery of chemicals are indicated. Describes general types of chemicals that can be obtained. Data for an integrated plant for the

production of chemicals are given. Products would consist of 6.1% by weight tar acids, 50.8% aromatics, 16.4% LPG, and 26.7% gasoline. Tables and flow diagrams.

7703 Synthetic Detergents. Clyde Williams. *Monthly Business Review*, v. 34, Apr. 1952, p. 12.

A general discussion of the above, including recent development, properties of cleansing agents, and advantages and applications of detergents.

7704* West Texas' First Sulfur-Recovery Unit. H. H. Jones and R. A. Graff. *Oil and Gas Journal*, v. 50, Apr. 21, 1952, p. 122-123, 153-154.

Describes above, utilizing a modified Clausprocess. Waste acid from an amine-treating unit is processed in this Permian basin plant, which recovers 20 tons per day. Flow diagram. Photographs.

7705 Processing Sulfur Bearing Gases. C. L. Blohm. *Petroleum Engineer*, v. 24, Apr. 1952, p. C68-C72, C74.

Reviews development of procedures and equipment for recovery of sulfur from sour gases, which has achieved a position of considerable importance in the present day economic situation. 30 ref.

7706 Petrochemicals From Water Gas. Parts 1 and 2. Peter W. Sherwood. *Petroleum Engineer*, v. 24, Apr. 1952, p. C28, C31, C33-C35; May 1952, p. C21-C22, C24-C26.

Advantages and drawbacks of the major production processes will be discussed in this series. (To be continued.)

7707 New Autofining Process. *Petroleum Processing*, v. 7, Apr. 1952, p. 467-469.

The Anglo-Iranian Oil Co., Ltd., of England, has developed to the commercial stage a fixed-bed catalytic desulfurization process in which operating pressures and temperatures are controlled to produce sufficient H_2 by the dehydrogenation of naphthenes in the feedstock for the conversion of the S in the feedstock into H_2S. No outside H_2 is required. Tabular data.

7708 Determining Volume Changes in Hydrocarbon Blending. E. J. Reeves. *Petroleum Processing*, v. 7, Apr. 1952, p. 478-479.

14 references.

7709 A New Venture in Petrochemicals. What is a Petrochemical? William F. Bland. **How Big Will the Industry Grow?** V. B. Guthrie. **Stability of Supplies and Prices Are Petrochemicals Big Assets. Where the Industry Stands Today and Who's Doing What In It.** *Petroleum Processing*, v. 7, Apr. 1952, p. 489-497.

7710 First Udex Unit Recovers Benzene. D. P. Thornton, Jr. *Petroleum Processing*, v. 7, Apr. 1952, p. 498-501.

Describes new solvent-extraction process for separating aromatics put in operation by Eastern States in Houston.

7711 Fertilizer From Refinery Wastes. Charles G. Bragg. *Petroleum Processing*, v. 7, Apr. 1952, p. 502-505.

Tells how General Petroleum both reduces pollution problems at less cost and recovers valuable products. Diagrams and illustrations.

7712 U. S. Petrochemical Operations. *Petroleum Processing*, v. 7, Apr. 1952, p. 509-510, 513-516, 518-520.

A complete directory of facilities in this country for the manufacture of petrochemical products; benzene, toluene, and xylene; sulfur; and rubber copolymers. Tells where the plants are located, who operates them, the raw materials, and the finished products.

7713 Liquid Recovery From Hydrocarbon Gases. T. H. Anderson, Jr., and W. E. Colburn. *Petroleum Refiner*, v. 31, Apr. 1952, p. 137-141.

The selection of the optimum recovery process depends chiefly upon the feed gas, the desired recovery, and the dry gas specifications. A complete example case is developed to illustrate how these factors are weighed in the selection of the most economical processing scheme.

7714 Ethylene by Steam Pyrolysis of Ethane. R. A. Carpenter and F. C. Fowler. *Petroleum Refiner*, v. 31, Apr. 1952, p. 148-149.

Presents experimental data which reveal that conversion of ethane to ethylene may be accomplished with yields exceeding 60% per pass. These yields are possible in the presence of steam and are accompanied by negligible carbon deposition.

7715 Volumetric Contractions in Blending of Hydrocarbons. E. J. Reeves. *Petroleum Refiner*, v. 31, Apr. 1952, p. 154-155.

Correlates blending data for various hydrocarbon liquids, including ethane, propane, butane, heptane, decane, benzene, naphtha, kerosene, and crystal oil. Volumetric corrections are presented in both tabular and graphical form and range as high as 30% variation from ideality in some cases.

7716 In Reforming—It's the Catalyst That Counts. M. J. Fowle, R. D. Bent, B. E. Milner, and G. P. Masologites. *Petroleum Refiner*, v. 31, Apr. 1952, p. 156-159.

Describes the Atlantic catalytic reforming process, which is now emerging from pilot-plant development to commercial operation.

7717 Catalytic Cracking of High Nitrogen Charge Stock. Part II. Discussion of Results. J. W. Schall and J. C. Dart. *Petroleum Refiner*, v. 31, Apr. 1952, p. 173-176.

Discusses the generalized characteristics of high-nitrogen-content charge stocks, and the data obtained in this study are made applicable to other high-nitrogen-content charge stocks by means of combination charts.

7718* Respect Aspects of the Chemical Utilization of Coal. (In French.) E. Mertens. *Revue universelle des Mines, de la Métallurgie des Travaux Publics, des Sciences et des Arts appliqués a l'Industrie*, ser. 9, v. 95, Apr. 1952, p. 94-107.

Surveys recent developments in production of liquid and gaseous fuels, and of organic chemicals, from coal. Graphs and equipment diagrams.

7719 The Moisture Relations of Textile Fibres at High Humidities. D. K. Ashpole. *Proceedings of the Royal Society*, ser. A, v. 212, Apr. 8, 1952, p. 112-123.

Conditions for the attainment of atmospheres of high humidity are discussed and new techniques are shown to be necessary. The main requirements are conditions favoring rapid transfer of moisture to the sample and adequate temperature control. A simple new apparatus is described together with experimental methods employed. It is concluded that the hysteresis loop closes at saturation. Other related phenomena are discussed.

7720* CSMA Textile Resistance Test. *Soap and Sanitary Chemicals.* (1952 Blue Book and Catalog Edition), p. 258-262, 276.

Presents tentative methods of test for resistance of textiles to insect pests.

7721* Experimental Chemical Treatments for Kraft Mill Wastes. W. A. Moggio. *Tappi*, v. 35, Apr. 1952, p. 150A-151A.

7722* Sulphur Dioxide From Sulphides by FluoSolids. N. A. Jull and W. T. Marston. *Tappi*, v. 35, Apr. 1952, p. 151A-154A.

Discusses advantages of above process.

7723* Mechanics of Elastic Performance of Textile Materials. Part VIII: Graphical Analysis of Fabric Geometry. E. V. Painter. *Textile Research Journal*, v. 22, Mar. 1952, p. 153-169.

Graphs were developed to simplify the study of fabric geometry. A simultaneous plot of the mathematical relations developed by Peirce aids in visualizing dimensional changes in fabrics and gives accurate values of the various parameters without length calculations and interpolations from tables. The use of the graphs is discussed as they apply to various types of weaves, fibers, and their dimensional changes.

7724* Some Theoretical Aspects of Yarn and Fabric Density. R. M. Hoffman. *Textile Research Journal*, v. 22, Mar. 1952, p. 170-178.

25. *Chemical Technology*

7725* Enzymic Degradation of Cellulose Fibers. Robert Blum and William H. Stahl. *Textile Research Journal*, v. 22, Mar. 1952, p. 178-192.

22 references.

7726* The Problem of Vinylation of Cellulose. (In Russian.) V. V. Shtishenskii, N. A. Obolonskaia, and N. I. Nikitin. *Zhurnal Prikladnoi Khimii*, v. 24, Oct. 1951, p. 1045-1051.

Discusses the above. Data are tabulated. 19 ref.

Miscellaneous Publications

7727 Tall Oil Refining. (In English.) Ake Linder. *Acta Polytechnica* (Chemistry Including Metallurgy Series), v. 2, no. 10, 1951, 56 pages. (T1 Ac81)

Describes some developemnts in the above, especially methods used industrially. Equipment is diagrammed; data are tabulated. 159 ref.

7728 Profitable By-Products From Wood Manufacturing Waste. P. H. Graham. American Society of Mechanical Engineers, Paper 51-A-84, 1951, 9 pages. (TJ1 Am35p)

Manufacturing waste is considered from the standpoint of secondary manufacturing plants which produce wood products by mass-production methods. Recommended general procedures for organization of a wood-waste salvage operation are discussed. Some specific items made from wood waste are described.

7729* Benzole and Toluene From Coal Gas. His Majesty's Stationery Office, 1950, 74 pages. (TP248 B4. G79b)

Report on technical work carried out between 1941 and 1945 by the British Ministry of Fuel and Power. Main sections of this mimeographed report are as follows: Benzole and Toluene in Various Fuel Gases; Recovery of Benzole and Toluene; and Methods of Analysis and Calculation. Includes extensive folded tables.

7730 Use of Solar Energy in Evaporation of Dead Sea Brine. M. R. Bloch. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 261-264; disc., p. 265-268. (HC13 Un3p)

Presents technical information on the above. Graphs.

7731 The Characteristics of Pulp Fibers From Agricultural Residues. Elbert C. Lathrop. Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Dept. of Agriculture, A1C-323, Jan. 1952, 12 pages. S584 Un3aoi)

Perhaps the most critical problem presented by the rapidly increasing world demand for cellulose pulps is the supply of softwoods. The long-fibered pulps produced from them are essential for the manufacture of wrapping and other high tear-resistance papers. Shows how a partial, practical, and economic solution to the problem can be given on the basis of chemical and physical characteristics of pulp fibers from agricultural residues. Examples of applied research are described which point the way to success in this field.

7732 Recent Advances in Pulping Straw in the United States. S. I. Aronovsky. Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture, A1C-324, Dec. 1951, 11 pages. (S584 Un3aoi)

Reviews the above and presents results of some experiments conducted at Northern Regional Research Laboratory, Peoria, Ill.

Books

7733 The Chemical Revolution: A Contribution to Social Technology. Archibald Clow and Nan L. Clow. 680 pages. 1952. Batchworth Press, London. (HD2321 C62c)

History of development of the chemical industry, as a concomitant to the Industrial Revolution, with emphasis on Britain. 29-page bibliography.

7734 Chemistry and Technology of Wines and Liquors. Ed. 2. Karl M. Herstein and Morris B. Jacobs, 436 pages. 1948. D. Van Nostrand Co., New York. (TP505 H43c2)

Provides some chapters of both the theoretical and the practical type, with probably major emphasis on the latter, since the industry still is very largely an "art" rather than a science. Diagrams, tables, and illustrations.

7735 The Chemistry of Synthetic Dyes. K. Venkataraman. 704 pages. 1952. Academic Press, Inc., New York. (TP913 V55c)

A comprehensive survey of the entire field. Contents include the chemistry of intermediates and dyes, the application of dyes, the relation between color and chemical constitution, action of light on dyes, and the chemical constitution of dyes in relation to affinity for textile fibers.

7736* British Chemical Plant. 299 pages. 1951. British Chemical Plant Manufacturers Assn., London. (Directory Shelf)

A directory, including classified index of products and services.

See also:

6829 (oxidation and reduction: survey of commercial developments)
7936 (production of protein-base fiber)
7995 (colloidal carbon in the paint and rubber industry)
8024 (production of coal-tar coatings)
8032 (fluorine in phosphate fertilizers)
8054 (foreign raw materials of plant origin)
8067 (production of potassic fertilizers)
8220 (fluid dynamics in chemical engineering)

26. CHEMISTRY—GENERAL, INORGANIC, AND PHYSICAL

7737* The Fine Structure of Active Carbon. (In Russian.) V. I. Danilov and A. M. Zubko. *Doklady Akademii Nauk SSSR*, new ser. v. 82, Jan. 21, 1952, p. 385-388.

Data on the above are charted and discussed.

7738* The Catalytic Action of Copper on Oxidation-Reduction Reactions. (In Russian.) A. A. Gurevich. *Doklady Akademii Nauk SSSR*, new. ser., v. 82, Jan. 21, 1952, p. 431-433.

Reviews and discusses literature on the above.

7739* Structure of Basic X-Ray Adsorption Bands of Ions in Solution. (In Russian.) K. I. Narbutt, R. L. Barinskii, and E. E. Vainshtein. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 1, 1952, p. 567-570.

Mn^{++}, Ni^{++}, Cu^{++}, and Zn^{++} ions were included in investigating the above. Data are discussed, tabulated, and charted. 16 ref.

7740* Ideal Type of Crystallization Diagrams of Two-Component Peritectic Solid Solutions. (In Russian.) V. M. Kravchenko. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 1, 1952, p. 597-600.

An "ideal" temperature-composition diagram for binary systems is described. The transition from the simple "ideal" system to a peritectic system is illustrated by real systems. Molecular structure is used to explain differences of systems such as $n\text{-}C_6H_4BrI$–$C_6H_4I_2$ and $n\text{-}C_6H_4ClI$–$n\text{-}C_6H_4I_2$. 11 ref.

7741* Solid Solutions in the ZnO-Fe_2O_3 System. (In Russian.) N. A. Toropov and A. I. Borisenko. *Doklady Akademii Nauk, SSSR*, new ser., v. 82, Feb. 1, 1952, p. 607-609.

Results of X-ray investigation are tabulated, discussed, and shown graphically.

7742* Crystal Structure of the Higher Oxides of Metals of the First Group of the Periodic System. (In Russian.) G. S. Zhdanov and Z. V. Zvonkova. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 11, 1952, p. 743-746.

X-ray studies were made of the above. Data are discussed, tabulated, and charted. 18 ref.

7743* Directed Valency for Coordination Numbers 6 and 8. (In Russian.) M. G. Shirmazan and M. E. Diatkina. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 11, 1952, p. 755-756.

The above is discussed, particularly with referenec to the

structures of $UF_6K_2TaF_8$ and similar combinations. Data are tabulated.

7744* An Isomorphic Series of Binary Oxides A_2BO_5 With Structures of the "Anosovite" Type. (In Russian.) G. S. Zhadnov and A. A. Rusakov. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 21, 1952, p. 901-904.

The structures of various titanium oxides and titaniferous minerals were studied by X-rays. Data are tabulated and discussed.

7745* Zonal Change in the Density of Magnetite Crystals. (In Russian.) L. N. Ovchinnikov and A. S. Shur. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 21, 1952, p. 977-979.

Investigation showed that magnetite grains varied in structure and density from the surface to the center. Results are discussed and tabulated.

7746* Sorption and Catalytic Properties of Certain Bleaching Agents (Earths). (In Russian.) V. T. Bykov and M. I. Kuadzhe. *Izvestiia Akademii Nauk USSR*, Section of Chemical Sciences, Sept.-Oct. 1951, p. 487-499.

Studies were made of bleaching earths from several deposits. Data are tabulated and charted.

7747* Catalytic Properties and Structure of Active Zinc Oxide. Report 4. Influence of Method of Preparation on the Electron-Microscopic Structure of Zinc Oxide. (In Russian.) A. B. Shekhter and G. M. Zhabrova. *Izvestiia Akademii Nauk USSR*, Section of Chemical Sciences, Sept.-Oct. 1951, p. 500-504.

Includes 16 electron micrographs.

7748* Investigation of the Kinetics of Dehydration of Formic Acid on Phosphate Catalysts and on Aluminum Oxides. (In Russian.) L. Kh. Freidlin and A. M. Levit. *Izvestiia Akademii Nauk USSR*, Section of Chemical Sciences, Sept.-Oct. 1951, p. 625-630.

7749* Kinetics of the Regeneration of Aluminosilicate Catalysts. Nature of the Oxidation of "Cokes" by Aluminosilicate Catalysts. (In Russian.) G. M. Panchenkov and N. V. Golovanov. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Oct. 1951, p. 1513-1520.

Discusses the oxidation of coke and tar deposits on the surface of catalysts used in petroleum refining. Data are charted.

7750 The Use of the Gradient Tube for the Determination of Crystal Densities. Barbara W. Low and F. M. Richards. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1660-1666.

A study was made of the applicability of the gradient-column technique to determination of the densities of crystalline solids. The usable density range was extended to provide coverage for a wide variety of crystalline preparations. Use of the column has led to a modification which appears better suited to the determination of solid densities. The modified gradient column is the basis of a new method for the detection and separation of impurities in crystalline preparations. The method has also been used to demonstrate the formation of mixed crystals between components of known and different densities. 37 ref.

7751 The Products of Thermal Decomposition of Chromium Trioxide. Robert S. Schwartz, I. Fankuchen, and Roland Ward. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1676-1677.

Above were studied by means of X-ray diffraction and chemical analysis. These compounds, intermediate between CrO_3 and Cr_2O_3, were found: Cr_3O_8, Cr_2O_5 and CrO_2. By using oxygen pressures up to 900 psi. in the range 322-563°C. preparation of each of these oxides in relatively pure form was accomplished. No evidence was obtained for existence of oxide phases of variable composition.

7752 Equilibrium Measurements in the Ni_3C—Ni—CH_4—H_2 and Co_2C—Co—CH_4—H_2 Systems. L. C. Browning and P. H. Emmett. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1680-1682.

7753 Studies on the Alkaline Earth Diuranates. Henry R. Hoekstra and Joseph J. Katz. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1683-1690.

Methods for preparation of the above were examined and pure compounds obtained by thermal decomposition of the respective metal-uranyl acetates. Thermal stability of the metal diuranates in vacuum and in the presence of oxygen at temperatures up to 1100°C. were investigated by tensimetric methods. 20 ref.

7754 Catalytic Activity of Supported Manganese Oxides for the Hydrogen Peroxide Decomposition. John Mooi and P. W. Selwood. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1750-1754.

Catalytic decomposition of H_2O_2 in dilute water solution on various supported Mn oxides was studied. Activity of these catalysts as a function of the concentration of Mn on the support shows an increase with decreasing Mn concentration, followed by a sudden decrease for very low Mn concentration, followed by a sudden decrease for very low Mn concentrations. The influence of oxidation state, pH, support phase modification, and temperature was also studied.

7755 X-Ray Studies of Fused Salt Systems. II. Indium (III) Iodide. III. Tin (IV) Iodide. R. E. Wood and H. L. Ritter. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1760-1764.

Analyses of the X-ray diffraction pattern of fused InI_3 and SnI_4 by the method of Warren, Krutter, and Morningstar are reported.

7756 Chemistry of Technetium. II. Preparation of Technetium Metal. J. W. Cobble, C. M. Nelson, G. W. Parker, W. T. Smith, Jr., and G. E. Boyd. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1852.

Recent large-scale separations of technetium from fission product wastes at the Oak Ridge National Laboratory have made chemical studies possible using readily weighable amounts. Preparation of fractional gram quantities of pure metallic technetium is described.

7757 Phosphonous and Phosphonic Cation Exchange Resins. J. I. Bregman and Yoshiaki Murata. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1867-1868.

Letter to the Editor includes titration curve.

7758 The Pressure—Volume—Temperature Relations of 3-Methylpentane. H. O. Day and W. A. Felsing. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 1951-1953.

Vapor pressures of 3-methylpentane were determined for the range of 150-231.2°C. Equations representing these data are presented and a comparison with previously reported data is made. Compressibility data in the range 80-275° C., and calculated values of molar heats of vaporization, are tabulated. 15 ref.

7759 Catalytic Hydrogenation of the Oxides of Carbon to Higher Hydrocarbons. Robert N. R. Mulford and W. Walker Russell. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 1969-1974.

Deals with effects of various inorganic K or Na salts added prior to catalyst precipitation, upon ceria-promoted, Cu-containing Co catalysts. Tables.

7760 Heat Capacities at Low Temperatures and Entropies at 298.16°K. of Metatitanates of Barium and Strontium. S. S. Todd and R. E. Lorenson. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2043-2045.

Heat-capacity measurements were conducted over the range 51-300°K. Two heat-capacity peaks were found for Ba metatitanate. Entropies at 298.16°K. were obtained for Ba metatitanate, Sr metatitanate, and a crystalline solution. Tables. 10 ref.

7761 The Thermal Dissociation of Some Chromium (III) Iodides. Lyman L. Handy and N. W. Gregory. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2050-2052.

Equilibrium pressures of iodine above CrI_3, $CrICl_2$, and $CrIBr_2$ were measured. Thermodynamic properties of the last 2 are similar to these anticipated for a solid solution of CrI_3 and CrX_3 as suggested by structural properties. 12 ref.

26. *Chemistry—General, Inorganic, and Physical*

7762 Conductances of Aqueous Solutions of Some Rare Earth Chlorides at 25°. F. H. Spedding, P. E. Porter, and J. M. Wright. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2055-2058.

Gives above for La, Ce, Pr, Nd, Sm, Eu, Er, Yb in the concentration range 0.0004-0.1 N. The anticipated uniform change in properties with atomic number was not found for the first 4 members of the series, but beyond these, the behavior was as expected. Graphical and tabular data. 11 ref.

7763 Some Observations on Neptunium (V) Compounds. G. Gibson, D. M. Gruen, and J. J. Katz. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2103-2104.

Chiefly concerns the oxidation state of Np in the compound Np_2O_5.

7764 The Reaction of Sodium Tungsten Bronze With Molybdenum (VI) Oxide. The Sodium Molybdenum Bronze. M. E. Straumanis and K. K. Irani. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2114-2115.

Presents a brief account of preparation and some reactions of the above. 10 ref.

7765 Adsorption and Reaction of Carbon Monoxide on Promoted Iron Catalysts. R. E. Probst, Seymour Meyerson, and Herman S. Seelig. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2115-2116.

Shows, in reference to the above, and contrary to published data, that chemical reactions can occur below 150°C.; Fe pentacarbonyl and CO_2 were produced. 18 ref.

7766* Differential Thermal Analysis of the Dolomite Decomposition. Robert A. W. Haul and Hendrik Heystek. *American Mineralogist*, v. 37, Mar.-Apr. 1952, p. 166-179.

Samples of dolomite, calcite, and magnesite were submitted to differential thermal analysis under various CO_2 pressures. Results are discussed in relation to the reaction mechanism of the thermal decomposition of dolomite. 21 ref.

7767* Paper Electro-Chromatography of Inorganic Substances. (In English.) M. Lederer and F. L. Ward. *Analytica Chimica Acta*, v. 6, Apr. 1952, p. 355-362.

Discusses variables influencing a given separation and the mechanism of electromigration. Describes details for separation of the Cu group and Fe, Ni, and Co. Apparatus diagrams and tables.

7768* Investigation of the Structure of Fused Inorganic Materials and Amorphous Substances. (In German.) J. E. Hiller. *Angewandte Chemie*, v. 64, Apr. 21, 1952, p. 209-212.

On the basis of experiments and calculations, the example of the glasses is used to show that there is also a loose form of arrangement in the amorphous stage; but that, in contrast with crystals, it lacks periodicity and thereby symmetry. Differences in distance between particles and in coordination numbers between the crystalline and the amorphous states are shown for Se, Sb, As, molten metals, water, A, and N_2. 35 ref.

7769* Preparation and Properties of Uranylcarbonates. I. Sodium Uranylcarbonates. (In French.) Bachelet, Cheylan, Douis, and Goulette. *Bulletin de la Société Chimique de France*, Jan.-Feb. 1952, p. 55-60.

Reactions of uranium oxide with Na_2CO_3, and $NaHCO_3$ solutions, were studied. Tables, diagrams, and graphs.

7770* Research on the Anodic Oxidation of Ferrochromiums. IV. Prolonged Oxidation in Alkaline Solution. Production of the Chromate and the Bichromate. (Concluded.) (In French.) Chu Yung Chao and Jean Besson. *Bulletin de la Société Chimique de France*, Jan.-Feb. 1952, p. 123-127.

Purpose of the research was production of chromates and bichromates. Results of experiments on electrolysis of ferrochromium compositions in various solutions are described. Data are charted and conclusions summarized.

7771* "Liquid-Solid" Equilbria in the Quaternary System: NaCl-KCl-$CaCl_2$-NaF-KF-CaF_2. (The Three Corresponding Ternary Systems, the Ternary System of Three Fluorides, The KF-CaF_2 Binary System). (In French.) Mohammad Ishaque. *Bulletin de la Société Chimique de France*, Jan.-Feb. 1952, p. 127-138.

7772 Investigation of the Forms of Phosphorus In Neutron-Bombarded Phosphates. III. Superphosphate and Calcium Sulphate Hemihydrate. J. G. A. Fiskell, W. A. DeLong, and W. F. Oliver. *Canadian Journal of Chemistry*, v. 30, Mar. 1952, p. 185-193.

7773 Evaporation From Drops. Part II. W. E. Ranz and W. R. Marshall, Jr. *Chemical Engineering Progress* (Engineering Section), v. 48, Apr. 1952, p. 173-180.

Theoretical and experimental treatment. Gives and discusses results on above for pure H_2O, benzene, and aniline for various air temperatures and velocities. Presents data on drops containing solids in solution and suspension. Tables and graphs. 35 ref.

7774* Pressure Hydrogenation With Ultrasonic Waves. Preliminary Report. (In German.) P. Möckel. *Chemie-Ingenieur-Technik*, v. 24, Mar. 1952, p. 153-155.

A method is described for developing pressures in a reaction material with the aid of ultrasonic waves. These pressures are not noticeable from the outside as they appear only at the phase boundaries between gaseous and liquid states. This method makes it possible to carry out pressure hydrogenations in open glass equipment.

7775* Cryoscopic Study of Solutions of Certain Metallic Oxides in the Cryolite-Fluoride Eutectic of Sodium. (In French.) Georges Petit. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 17, 1952, p. 1281-1283.

Presents the above with respect to lanthanum oxide, alumina, boric anhydride, magnesia, lime, beryllia, and cerium oxide, showing cryoscopic curves.

7776* Electrolysis of Phosphoric Acid Between Copper Electrodes. Case of Weak Current Densities. (In French.) Denise Laforgue-Kantzer. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 17, 1952, p. 1284-1287.

Experimental and theoretical discussion of the mechanism of anodic dissolution of Cu at very weak current densities, particularly when the Cu^+-ion concentration is high. Graphs.

7777* Electrochemical Studies by the Radioactive-Tracer Method. (Electrolyses in Extremely Dilute Solutions.) (In French.) M. Haïssinksy. *Experientia*, v. 8, Apr. 15, 1952, p. 125-132.

The ordinary methods of determining electrochemical potentials cease to be applicable in extreme dilution. Energy conditions for formation of very thin electrodeposits (less than a monoatomic layer) can then be explored by means of radioactive indicators, following particular polarization curves. Discusses relationship between critical potential defined by such curves and theoretical potential computed from the Nernst equation for the given concentration. Experimental results are collected for critical potentials of deposition of Po, Bi, Pb, Ag, etc., from extremely dilute solutions onto various metals. Shows that the heterogeneity of the electrode surface plays a considerable role in these electrolyses. Explains the overvoltage and undervoltage observed in certain cases, and the exponential form of the polarization curves. 74 ref.

7778 The Determination of Molecular Weights of Macromolecules From Measurements of Osmotic Pressure. E. A. Guggenheim and M. L. McGlashan. *Transactions of the Faraday Society*, v. 48, Mar. 1952, p. 206-211.

A new method of analyzing osmotic-pressure measurements on solutions of non-polar macromolecules in non-polar solvents is described. The method is applied to the measurements of Bawn and others on solutions of polystyrene in toluene. The estimates so obtained for molecular weights differ from those of Bawn.

7779 The Diamagnetic Susceptibility of Some Acetoacetates. C. M. French. *Transactions of the Faraday Society*, v. 48, Mar. 1952, p. 216-219.

The refractivities and magnetic susceptibilities of a series of acetoacetic esters were measured. The diamagnetic susceptibility increments between successive members of the series have been shown to vary significantly, in some cases, from the value for many simple homologous series. It is suggested that the

variations are, in part at least, due to different contributions to the equilibrium condition of each ester, by the different tautomeric structures.

7780 Thermochemistry of Metallic Alkyls. Part V.—Mercury Di-Propyl and Mercury Di-Isopropyl. C. T. Mortimer, H. O. Pritchard, and H. A. Skinner. *Transactions of the Faraday Society*, v. 48, Mar. 1952, p. 220-227.

Measurements of the heats of reaction of mercury di-propyl and of mercury di-isopropyl with bromine, iodine, and the mercuric halides in methanol solution at 20°C. are reported. These data are used to derive values for the heats of formation of the mercury di-alkyls in the liquid state, and of the crystalline mercury alkyl halides. 32 ref.

7781 The Ionization and Dissociation of Hydrogen Peroxide Induced by Electron Impact. A. J. B. Robertson. *Transactions of the Faraday Society*, v. 48, Mar. 1952, p. 228-234.

The formation of the ions $H_2O_2^+$,HO_2^+,OH^+, and O^+ from H_2O_2 subjected to electron bombardment was examined, to obtain data for a study of the reactions of HO_2, OH and O in the presence of H_2O_2. 21 ref.

7782 The Oxidation of Ethylene Oxide in the Vapour Phase. J. H. Burgoyne and P. K. Kapur. *Transactions of the Faraday Society*, v. 48, Mar. 1952, p. 234-243.

7783 The Kinetics of the Hydrolysis of Methyl Nitrate and of Methyl Acetate in Aqueous Solution. J. S. McKinley-McKee and E. A. Moelwyn-Hughes. *Transactions of the Faraday Society*, v. 48, Mar. 1952, p. 247-253.

The kinetics of the uncatalyzed hydrolysis of methyl nitrate and of the acid catalyzed hydrolysis of methyl acetate were investigated in aqueous solution. The apparent energies of activation are found to decrease with a rise in temperature. 23 ref.

7784 The Reaction of Ammonia and Deuterium on Evaporated Nickel Catalysts. Charles Kemball. *Transactions of the Faraday Society*, v. 48, Mar. 1952, p. 254-258.

7785 The Solubilities of Sparingly Soluble Salts in Water. 1. The Solubility of Silver Chloride at 25°C. J. A. Gledhill and G. McP. Malan. *Transactions of the Faraday Society*, v. 48, Mar. 1952, p. 258-262.

The solubility of AgCl in water at 25°C. is determined conductometrically, using water of exceptional purity to reduce the solvent conductance and employing a correction for the solution of glass during the experiment. The value obtained agrees with that found by Owen's potentiometric method to within the estimated limits of experimental error. There is no reason to believe that aged AgCl prepared by precipitation differs in solubility from that prepared electrolytically. 18 ref.

7786 Compressional Energy and Resonance Energy. C. A. Coulson and S. L. Altmann. *Transactions of the Faraday Society*, v. 48, Apr. 1952, p. 293-302.

Analysis is made of the theoretical significance of the concept of resonance energy in aromatic and conjugated molecules, and of the possibility of calculating it. Discussion centers around the compressional energy, which arises on account of differences in bond lengths between the resonating molecule and the standard nonresonating reference structure.

7787 Interpretation of the Thermodynamic Properties of Adsorbed Argon at Low Surface Coverages. L. E. Drain and J. A. Morrison. *Transactions of the Faraday Society*, v. 48, Apr. 1952, p. 316-326.

Measurements of some thermodynamic properties of A adsorbed on TiO_2 (rutile) at low surface coverages were described in an earlier paper. It is now shown that these results may be interpreted satisfactorily on a model of localized adsorption on a heterogeneous surface without interactions. Configurational entropy is discussed in connection with recent work of Everett.

7788 On Multilayer Adsorption Isotherms. O. Theimer. *Transactions of the Faraday Society*, v. 48, Apr. 1952, p. 326-331.

The molecular model underlying the B.E.T. formula is discussed and it is stressed that, on the assumption that this theory is valid, distribution of the adsorbing centers along the surface is restricted to arrangements excluding 2-dimensional condensation.

7789* Dynamics of Real Gases. (In German.) W. Traupel. *Forschung auf dem Gebiete des Ingenieurwesens*, ser. B, v. 18, Jan. 1952, p. 3-9.

Shows how thermodynamic research results for ideal gases can be applied to "real" gases without mathematical complications. The proposed changes of mathematical terms apply to the most important gases. Includes graphs.

7790 Reactions of Ions in Aqueous Solution With Glass; Studies With Radioactive Tracers. Arthur O. Long and John E. Willard. *Industrial and Engineering Chemistry*, v. 44, Apr. 1952, p. 916-920.

Describes technique. Results are charted, tabulated, and discussed. 20 ref.

7791 Studies in Newtonian Flow. IV. Viscosity vs. Molecular Weight in Liquids; Viscosity vs. Concentration in Polymer Solutions. Arthur K. Doolittle. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 418-426.

Final installment in the current series. In this paper, the molecular weight–free-space function applicable to n-paraffins of molecular weights 100-240 at various temperatures is further generalized to apply to homologous series of all Newtonian liquids at constant temperature. Tables and graphs. 11 ref.

7792* Coordination Coefficients of Complex Molecules on Metals; The Case of Acetaldehyde at 273°K. on Platinum Between 1000 and 1300°K. (In French.) Xavier Duval and Michel Niclause. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, Feb. 1952, p. 51-59.

Discusses heat conductivity of gases at very low pressure, in particular with respect to the above case. Tables and graphs. 26 ref.

7793* Discontinuities of the Properties of Material as a Function of Temperature. (In French.) George Antonoff, Anton Urmanczy, and Alexis Yakimac. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, Feb. 1952, p. 82-84.

Discusses the above with respect to Antonoff's theory of aggregates. Tables and graphs.

7794* Electrode Phenomena During Electrolysis. (In French.) E. Darmois. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, Feb. 1952, p. C151-C153.

Discusses formation of a layer of adsorbed ions at the electrode. Graphs show properties of various positive and negative ions with respect to the above.

7795* Kinetics of Primary Reactions in Electrolysis Studied by Catholic Oscillography Using a Polarographic Method. (In French.) M. Fournier. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, Feb. 1952, p. C183-192; disc., p. C192-C193.

Influence of an alternating current in polarography was studied by use of potential-time curves obtained on an oscillograph, and with the aid of intensity-voltage curves traced on the polarograph while superimposing an alternating current. Diagrams, tables, and charts.

7796* Mechanical Surface Effects in Spark Electrolysis. (In French.) Pierre Barret. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, Feb. 1952, p. C194-C198.

Discusses atomization of the liquid surface during spark electrolysis, in which the surface of the solution behaves differently according to whether it is struck by an anodic spark or by a cathodic spark. Charts, drawings, and tables. 15 ref.

7797* The Temperature Effect of Half-Cells. (In French.) M. Bonnemay. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, Feb. 1952, p. C199-C209; disc., p. C209.

Discusses a method for determining the temperature effects of half-cells. Describes experiments which validate the method. Presents results obtained with various electrodes: H, Cu, Cd, Zn, and their amalgams. Indicates application of the method to measurement of potentials between two solutions of the same composition. Includes charts.

7798* Transfers of Energy in Active Nitrogen. Part I. Transfers With Mercury. Part II. Transfers With Cadmium, Zinc, Sodium, Potassium, and Antimony. (In French.) M.

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A. Finklestein. *Journal de Chimie physique et de Physico-Chimie biologique*, v. 49, Apr. 1952, p. 185-203.

By using high-sensitivity photocounters in the ultraviolet region it was found possible to demonstrate the excitation of the resonance rays of the above elements in active nitrogen. Includes charts and diagrams. 50 ref.

7799 Constitution and Stability of Complex Ions From Solubility Minima. C. A. Reynolds and William J. Argersinger, Jr. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 417-420.

A simple new method of determining both constitution and stability of certain complex ions from measurements of solubility minima is presented. Applications of method are discussed and calculations of stability using literature data are given. 24 ref.

7800 The Energy of Vaporization of Non-Ionic, Non-Associated Substances. J. H. Simmons and J. B. Hickman. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 420-426.

Presents a study which correlates energy of vaporization per molecule of gas of non-polar substance at 298.2°K. on the basis of polarizability, interpenetration, and entropy of fusion. Resulting expressions were generalized as to temperature. Energy of vaporization of a limited number of polar substances can also be correlated by means of a similar expression; however, in this case, the dipole moment must also be taken into consideration. Graphs and tables. 17 ref.

7801 On the Calculation of Entropy and Enthalpy Changes From Free-Energy Data. Reino W. Hakala. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 427-428.

Contributes further information to the Klotz and Fiess work on Cu (II)-albumin complexes.

7802 The Logarithmico-Normal Distribution of Particle Sizes: Homogeneity and Heterogeneity. F. Kottler. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 442-448.

Gives an algebraic analytical method for above where the particles belong to a heterogeneous population. Examples of such cases are encountered with photographic emulsions. Some information about growth of Ag halide grains can be derived from results of this method. Tabular and graphical data. 12 ref.

7803 Hysteresis of Contact Angles. A Study of Interfacial Contact Angles in the Mercury-Benzene-Water System. F. E. Bartell and Carl W. Bjorklund. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 453-457.

11 references.

7804 Production of the Joshi Effect Under Direct Current Excitation. H. J. Arnikar. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 457-461.

Deals with a study of the behavior of the above for various gases and vapors of an ozonizer from viewpoint of discharge characteristic and associated Joshi effect. Considers positive and negative effects. Oscillograms revealed complete suppression under light of the H. F. pulses corresponding to 100% negative Joshi effect. Diagrams and tables. 16 ref.

7805 Viscosity, Density, and Critical Constants of OF_2. R. Anderson, J. G. Schnizlein, R. C. Toole, and T. D. O'Brien. *Journal of Physical Chemistry*, v. 56, Apr. 15, 1952, p. 473-474.

7806 On the Kinetics of Evaporation. S. S. Penner. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 475-479.

Above was reconsidered from the point of view of classical reaction kinetics and also by application of theory of absolute reaction rates. It is shown that evaporation treated as a unimolecular rate process, with a rate proportional to the surface concentration of energetic molecules, leads to the Knudsen equation for spherical molecules provided 6 square terms contribute to the energy of activation. Theoretical treatment is extended to polar liquids with restricted rotation and it is shown that the evaporation coefficient should be identified with free-angle ratio. 23 ref.

7807 The Boundary Tension at Water-Organic Liquid Interfaces. D. Joseph Donahue and F. E. Bartell. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 480-484.

Interfacial tensions at water-organic liquid interfaces were found to be a linear function of log of "degree of miscibility" of water with the organic liquids. A close parallelism between behavior of interfacial tension in vicinity of the critical solution temperature and behavior of surface tension in the vicinity of the critical temperature was noted. Presents a study on the above of the relationship between interfacial tension and mutual solubility of the liquids as well as the relationship between interfacial tension and surface tensions of saturated liquid phases. Tabular data. 21 ref.

7808 Activated Alumina. Part I. Heat of Wetting by Water. Part II. Heat of Wetting by Hydrocarbons. Vernon M. Stowe. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 484-489.

Presents a study of the above. Includes description of a new calorimeter for measuring heat of wetting, in which quantity of heat evolved is measured by titration with cold liquid, such as ice-water. Purpose was to form a basis for correlating behavior of adsorbents in preferential adsorption. Apparatus diagram, graphs, and tables. 14 ref.

7809 Adsorption of UX, and Ra E By An Aquadag Coated Dipping Geiger-Mueller Tube. I. Adler and J. Steigman. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 493-498.

Describes method for study of radio-colloids. A dipping Geiger-Muller counter is coated with an adsorbent, so that it serves simultaneously an accumulator and detector. The method was used to investigate UX and Ra E in aqueous solutions. Graphical data. 15 ref.

7810 The Photolysis of Cadmium Dimethyl. R. Dean Anderson and H. Austin Taylor, *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 498-502.

A study of the above for the purpose of understanding the mechanics involved for this compound and for $Hg(CH_3)_2$. Tables. 13 ref.

7811 The Hydrogen Bond in Organic Crystals. Jerry Donohue. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 502-510.

A review on the above of literature data from X-ray investigations where the accuracy of measurements of interatomic distance is 0.1 A or better. The bond types covered are: N-H . . N, N-H . . Cl, N-H . . O, O-H . . N, and O-H . . O. Lengths and strengths of these bonds are found to vary in a reasonable way with departure of angle C-XH . . X from the expected near-tetrahedral value, and with the situation of donor and acceptor terms. In general, strong hydrogen bonding occurs only when the H atom is collinear with bonded atoms. Tables and molecular structure diagrams. 64 ref.

7812 Dual Adsorption of Polar Organic Compounds on Steel. Norman Hackerman and E. L. Cook. *Journal of Physical Chemistry*, v. 56, Apr. 15, 1952, p. 524-526.

Presents a study on the degree of specificity of adsorption of steel powder toward various functional groups. Graphical data.

7813 Statistical Thermodynamics of the Transition Region Between Two Phases. I. Thermodynamics and Quasithermodynamics. Terrell L. Hill. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 526-531.

Mathematical. The thermodynamics and quasi-thermodynamics of plane and spherical surfaces are discussed, including an alternative formulation of Gibbs' surface thermodynamics and an improvement on the Tolman quasi-thermodynamic theory. 15 ref.

7814 The Effect of Atmospheric Gases on the Interfacial Tension Between Mercury and Several Different Liquids. F. E. Bartell and Richard J. Bard. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 532-538.

Presents a study of the above. Covers also significance of the definite, single values reported in the literature and conditions under which equilibrium values of interfacial tension can be observed. Time studies of interfacial tension were used throughout to provide the necessary experimental data. Graphs. 27 ref.

7815* Recent Discoveries in the Field of Thixotropy, Especially of Clay-Containing Gels. (In German.) U. Hofmann. *Kolloid Zeitschrift*, v. 125, Feb. 1952, p. 87-97; disc., p. 97-99.

Tables, electron micrographs, and diagrams. 58 ref.

7816* Elastic-Plastic Transformation of Sulfur. (In German.) H. Specker. *Kolloid Zeitschrift*, v. 125, Feb. 1952, p. 106-108; disc., p. 108.

Reviews literature and discusses mechanism of the above 10 ref.

7817* Surface-Chemical Studies of the Reactions Between Aluminum Ions and Fatty or Resinic Acids. (In German.) Per Ekwall. *Kolloid Zeitschrift*, v. 125, Mar. 1952, p. 129-138; disc., p. 138.

19 references.

7818* The Current Distribution in an Electrolytic Cell. (In English.) Shinzo Okada, Shiro Yoshizawa, and Fumio Hine. *Memoirs of the Faculty of Engineering* (Kyoto University), v. 14, Jan. 1952, p. 63-76.

Theoretical and mathematical treatment of a Krebs amalgam-type Cl cell; the graphite anode with many grooves, of a horizontal amalgam-type Cl cell; and a rectangular electrolytic cell. Diagrams.

7819 Self-Diffusion of Aliphatic Alcohols. J. H. Partington, R. F. Hudson, and K. W. Bagnall. *Nature*, v. 169, Apr. 5, 1952, p. 583-584.

Self-diffusion coefficients for water and a number of alcohols were measured at a series of temperatures, and experimental activation energies obtained.

7820* The Physical Characteristics of Titanium Pigments. *Paint Manufacture*, v. 22, Apr. 1952, p. 139-141; disc., p. 141-142.

7821 Investigations With Gas Density Balance. Part 1. The Principle and the Methods of Use. I. H. Silberberg and John J. McKetta, Jr. **Part 2. Compressibility Isotherms of Methane, Ethane, Propane, and N-Butane at Low Pressures.** I. H. Silberberg, P. K. Kuo, and John J. McKetta, Jr. *Petroleum Engineer*, v. 24, May 1952, p. C5-C8; C9-C10, C13-C14, C16-C20.

Covers the principle of the balance, 3 methods of using the balance for experimental work, and the use of air as a standard gas. Part 2 includes experimental results on low-pressure compressibility factors for methane, ethane, propane, and n-butane.

7822* The Specific Heat of Barium Titanate Between 100°K and 410°K. J. Volger. *Philips Research Reports*, v. 7, Feb. 1952, p. 21-27.

The specific heat of polycrystalline $BaTiO_3$ has been measured in a Nernst calorimeter. The lattice contribution cannot be described accurately with a single Debye function. In 3 transition regions, the anomalous peaks in the specific heat have been determined. Tables and graphs.

7823* The Growth of Cadmium Iodide Crystals: II. A Study of the Heights of Growth Steps on Cadmium Iodide. A. J. Forty. *Philosophical Magazine*, ser. 7, v. 43, Apr. 1952, p. 377-392.

Several methods for measuring step-heights on crystal surfaces are described.

7824* Some Recent Advances in Fluorine Chemistry. H. J. Emeleus. *Record of Chemical Progress*, v. 13, no. 1, 1952, p. 1-7.

7825* The Behaviour of Membranes Between Electrolyte Solutions. (In English.) P. Hirsch. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Mar. 1952, p. 354-360.

Data are tabulated, charted, and discussed.

7826* Time-Dependence of Boundary Tensions of Solutions. (In English.) A. F. H. Ward and L. Tordai. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Mar. 1952, p. 396-408.

10 references.

7827* Time-Dependance of Boundary Tensions of Solutions. III. Thermodynamics of the Boundary-Bulk Equilibrium of Fatty Acids in Hexane-Water Systems. (In English.) A. F. H. Ward and L. Tordai. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Apr. 1952, p. 482-489.

7828* Cryoscopic and Spectroscopic Studies of Mixtures of HNO_3 and BF_3. (In English.) H. Gerding, P. M. Heertjes, L. J. Revallier, and J. W. M. Steeman. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Apr. 1952, p. 501-508.

7829 Electrification in Aerosol Studies. Barton L. Hinkle and Clyde Orr, Jr. *Research Engineer* (Georgia Institute of Technology), Mar. 1952, p. 7-8, 19-21.

Describes experiments to determine the effect of vapors on the aggregation of an aerosol by varying the method of vapor production and by ionizing the air and vapors.

7830 The Diamagnetism of Ions. W. R. Myers. *Reviews of Modern Physics*, v. 24, Jan. 1952, p. 15-27.

Presents a comprehensive account of the state of this subject at the moment; discussion is limited to the simpler ions, alkali, alkaline-earth, and halogen. 44 ref.

7831 Molecular Weight Determinations by Effusiometry. Paul D. Zemany. *Review of Scientific Instruments*, v. 23, Apr. 1952, p. 176-177.

An effusiometer using a thermistor as a pressure gage is described. Molecular weights can be determined with it with an average error of ±2%. Only a few hundredths of a c.c. of gas at N.T.P. is required as a sample.

7832 The Thermodynamics of Hydrocarbon Solutions. I. Technique of Vapour-Pressure Measurements; The Vapour Pressure of Benzene. II. The Systems Benzene+Diphenyl, Benzene+Diphenylmethane and Benzene+Dibenzyl. D. H. Everett and Mary Frances Penney. *Proceedings of the Royal Society*, v. 212, ser. A, Apr. 22, 1952, p. 149-176.

Apparatus diagrams, tables, and graphs. 52 ref.

7833* Rectification of Ideal Ternary Mixtures. (In German.) H. Hausen. *Zeitschrift für angeandte Physik*, v. 4, Feb. 1952, p. 41-51.

Theoretical study. Diagrams and graphs.

7834* The Absolute Single-Electrode Potential (In German.) S. N. Bagghi. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie*, v. 56, Feb. 1952, p. 116-118.

Theoretical analysis of above concept.

7835* The Problem of Single-Electrode Potentials. (In German.) Hans Strehlow. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie*, v. 56, Feb. 1952, p. 119-129.

Discusses physical calculation of galvanic potentials as well as necessary assumptions for their calculation. Surveys recent theoretical and experimental work. 45 ref.

7836* Techniques in Colloid Measurements. II. The Range of Validity of the Arrhenius Formula and Its Importance in Computation of the Viscosity of Mixtures of Two Colloids. (In German.) H. H. Weber and B. von Kerekjarto. *Zeitschrift für Naturforschung*, v. 7b, Mar. 1952, p. 94-101.

20 references.

7837* A New Process for Separating Dissolved Substances by Thermal Diffusion in the Liquid Phase. (In German.) H. Korsching. *Zeitschrift für Naturforschung*, v. 7b, Mar. 1952, p. 187-191.

The process is demonstrated by application to a mixture of phenanthrene and 9-bromophenanthrene dissolved in benzene. Includes graphs and apparatus diagrams.

7838* Is Hydrazine Associated in the Gaseous State? (Vapor Density and Adsorption Measurements.) (In German.) G. Briegleb, H. Scholze, and W. Strohmeier. *Zeitschrift für physikalische Chemie*, v. 199, Jan. 1952, p. 15-21.

Apparatus is diagrammed; results are charted, tabulated, and discussed.

7839* Direct-Current Potential of the Iodine-Iodide Redox Potential on Platinum With an Excess of Foreign Electrolyte. (In German.) Klaus J. Vetter. *Zeitschrift für physikalische Chemie*, v. 199, Jan. 1952, p. 22-34.

Describes d.c. apparatus and procedure for measuring polarization. Current density vs. potential curves indicate the pre-

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dominance of diffusion polarization. Equilibrium constant of above reaction was determined. Diagrams, graphs, and tables. 15 ref.

7840* Kinetic Theory of Self-Diffusion and of the Viscosity of Liquids. (In German.) Kurt Altenburg. *Zeitschrift für physikalische Chemie*, v. 199, Jan. 1952, p. 69-89.

Results of theoretical study of the temperature dependence of the above are compared with experimental results. The relation between diffusion, viscosity, and friction is discussed. Tables and graphs. 16 ref.

7841* Modifications of Na_2BeF_4 and Their Relations to Ca_2SiO_4. (In German.) Erich Thilo and Friedrich Liebau. *Zeitschrift für physikalische Chemie*, v. 199, Jan. 1952, p. 125-141.

Debye patterns obtained in a hot camera revealed 5 modifications of Na_2BeF_4. Transformation conditions were determined. Comparison with Ca_2SiO_4 modifications prove the structural similarity of the two compounds. Tables, X-ray pictures, and photographs. 10 ref.

7842* The Fluorite Phase in the ZrO_2-CaO System. Its Disorder and the Appearance of Electrical Conductivity. (In German.) F. Hund. *Zeitschrift für physikalische Chemie*, v. 199, Jan. 1952, p. 142-151.

Describes experiments on the above, made to determine the disorder of these anomalous solid solutions from their lattice constants and densities, and to measure the temperature dependence of the electrical resistance of the solid solution. Tables and graphs.

7843* Nondiagonal Reciprocal Salt Systems of Calcium and Barium Fluorides and Chlorides. (In Russian.) G. A. Bukhalova and A. G. Bergman. *Zhurnal Obshchei Khimii*, v. 21(83), Sept. 1951, p. 1570-1579.

Solidus curves for the above systems were determined experimentally. 3-dimensional models of the equilibrium diagrams are shown in photographs. Data are tabulated and charted. 21 ref.

7844* Interaction of Molten Nitrate and Nitrites of First and Second Group Metals. III. Investigation of the Molten Ba-Ca-Na Nitrates System. (In Russian.) P. I. Protsenko and A. G. Bergman. *Zhurnal Obshchei Khimii*, v. 21(83), Sept. 1951, p. 1580-1587.

7845* The Mechanism of the Catalytic Action of Aluminum Chloride. II. Structure of Complexes With Halogen Anhydrides, Ketones, and Other Oxygen Compounds. (In Russian.) N. N. Lebedev. *Zhurnal Obshchei Khimii*, v. 21(83), Oct. 1951, p. 1788-1794.

An ultraviolet spectroscopic study was made of the above. It was shown that in chloranhydrides, the $AlCl_3$ is attached to oxygen atoms. A new formula for such compounds is presented. Data are tabulated and charted. 13 ref.

7846* Kinetics of the Reaction Between SO_2 and Ferric Sulfate in Aqueous Solution. (In Russian.) I. N. Kuzminykh and T. B. Bomshtein. *Zhurnal Prikladnoi Khimii*, v. 24, May 1951, p. 453-459.

7847* The Transition of a Catalyst Into the Heterogeneous State and the Basic Causes of This Phenomenon. (In Russian.) B. K. Tsyskovskii and N. A. Kiseleva. *Zhurnal Prikladnoi Khimii*, v. 24, May 1951, p. 527-531.

Discusses the above. Data are charted and tabulated.

7848* Kinetics of Absorption Under Conditions of Intensive Agitation. (In Russian.) M. Kh. Kishnevskii. *Zhurnal Prikladnoi Khimii*, v. 24, May 1951, p. 542-545.

Theoretical, mathematical analysis.

7849* Problems of the Stability of Complex Compounds and of Exchange Reactions. (In Russian.) A. A. Grinberg and L. E. Nikolskaia. *Zhurnal Prikladnoi Khimii*, v. 24, Sept. 1951, p. 893-903.

Theoretical and experimental study. 24 ref.

7850* The Production of Sodium Manganate and Permanganate by Anodic Solution of Metallic Manganese. (In Russian.) P. I. Agladze and G. M. Domanskaya. *Zhurnal Prikladnoi Khimii*, v. 24, Sept. 1951, p. 915-924.

Miscellaneous Publications

7851 Progress Report on the Study of Supercompressibility Factors for Natural Gases. Richard H. Zimmerman and Samuel R. Beitler. American Society of Mechanical Engineers, Paper 51-A-153, 1951, 19 pages. (TJ1 Am35p)

Reports on present status of an evaluation of above. Aim of the work was to establish an accurate method for prediction of these factors within the range 0-4000 psi. and in terms of gas properties generally known or conveniently determined. Results are compared with supercompressibility factors experimentally determined on the Burnett deviation apparatus. 10 ref.

7852 Thermographic Analysis Under Elevated Pressures. L. C. Berg and I. S. Rassonskaya, Henry Brutcher, Translation No. 2850, 6 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 81, Dec. 11, 1951, p. 855-858.)

Previously abstracted from the original.

7853 Microwave Spectra of Molecular Gases and Their Evaluation. (In German.) W. Maier. *Ergebnisse der exacten Naturwissenschaften*, v. 24, 1951, p. 275-370. (QC21 Er38)

Presents comprehensive treatise on the above. 208 ref.

7854 The Vapor Pressure of American Trifluoride. Merle Eugene Jones. U. S. Atomic Energy Commission, AECD-3270, Aug. 1951, 34 pages. (UF767 Un3m)

Gives details of apparatus, procedure, and results obtained.

7855 Ion Exchange Equilibria Involving Fission Products and Thorium in Uranyl Nitrate. Jack Schubert. U. S. Atomic Energy Commission, AECD-3273, Jan. 1, 1945, 16 pages. (UF767 Un3m)

Presents details of experimental and theoretical investigation of the above. Data are tabulated and charted.

7856 Studies in the Carbonate-Uranium System. Part I. Investigations in the Four Component System UO_3-Na_2O-CO_2-H_2O. C. A. Blake, R. S. Lowrie, D. G. Hill, and K. B. Brown. U. S. Atomic Energy Commission, AECD-3280, Dec. 14, 1950, 39 pages. (UF767 Un3m)

10 references.

7857 Electrical Conductivity and Density of Fused Binary Mixtures of Magnesium Chloride and Other Chlorides. R. W. Huber, E. V. Potter, and H. W. St. Clair. U. S. Bureau of Mines, Report of Investigations 4858, Mar. 1952, 14 pages. (TN21 Un3r)

Conductivity and density of the molten chlorides $MgCl_2$, $CaCl_2$, $BaCl_2$, KCl, and NaCl and of binary mixtures of $MgCl_2$ with the other 4 chlorides were determined. Studies were also made on the binary system KCl-$CaCl_2$ and on certain portions of several ternary systems. Measurements covered a temperature range from the melting point to 1000°C. Data are charted and tabulated.

Books

7858 Chemical Calculations. Sidney W. Benson. 217 pages. 1952. John Wiley & Sons, New York. (QA297 B44c)

Designed to help the beginner adjust himself to the new language of chemistry, and overcome the difficulty of applying mathematical resoning to physical problems because it offers a consistent, rational, and integrated approach to the use of mathematics in chemistry. Gives a unified method to use in attacking all chemistry problems.

7859 Higher Chemical Arithmetic. F. W. Goddard. 1951. 221 pages. Longmans, Green & Co., New York. (QA300 G54h)

In each section, summaries are given of mathematical principles and practical methods involved in the usual subdivisions of chemistry, such as quantitative analysis, physical chemistry, and organic chemistry. Over 400 examples are presented.

7860 Fiziko-Khimicheskie Svoista Troinoi Sistemy Okis Natriia—Okis Svintsa—Kremnezem. (Physiochemical Properties of the Ternary System Sodium Oxide-Lead Oxide-Silica.) I. V. Grebenshchikov, editor. 220 pages. 1949. Academy of Sciences of the U.S.S.R., Moscow and Leningrad. (QD453 G79t)

A compilation of the results of research on this problem by several different investigators. The work was done by a series

of authors, but it represents essentially one investigation performed in different laboratories under the supervision of the editor.

7861 Diffusion in Solids, Liquids, Gases. W. Jost. 558 pages. 1952. Academic Press Inc., New York. (QC185 J79d)

Contains several theoretical chapters. Chief aim is to assist in planning, evaluating, and understanding diffusion experiments, at the same time giving a survey of the results obtained to date. Disorder in crystals; electrolytic conduction and diffusion in ionic crystals; diffusion in metals and non-polar crystals; diffusion and solubility in solids; mobility of ions in solid and molten metals and alloys; surface reactions of metals, formation of protective layers and related reactions; diffusion in gases and liquids; and thermal diffusion.

7862* Solubilities of Inorganic and Organic Compounds. Supplement to Ed. 3. Atherton Seidell, William F. Linke, Alfred W. Francis, and Roger G. Bates. 1254 pages. 1952. D. Van Nostrand Co., New York. (QD66 Se42s3)

Contains data published during the years 1939-1949 inclusive.

7863 The Size and Shape Factor in Colloidal Systems. 252 pages. 1951. Aberdeen University Press, Aberdeen, Scotland. (*Discussions of the Faraday Society*, no. 11, 1951.) (TK1 F22d)

Includes general introduction by Eric Rideal; 8 papers on classical colloids; 6 on colloids and polyelectrolytes; 6 on fibrous macromolecular systems; and 5 on viruses. A general discussion follows each group of papers. A few are separately abstracted.

See also:

6817 (laws of common discharge of ions)
6818 (preparation of Zr sulfate and oxide)
7126 (theory of phase transformations in solids)
7147 (determination of surface tension of metals)
7150 (neptunium thermodynamic properties)
7255 (dissolution of Cd in aqueous solutions)
7642 (preparation of TiN and ZrN)
7735 (chemistry of synthetic dyes)
7978 (structure of colloids)
8096 (chemical effects of ultrasonics)
8176 (electrical fields vs. internal friction of liquids)
8347 ("Man and the Chemical Elements"—book)

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7864* Mechanism of Catalytic Oxidation of p-Cymene in the Vapor Phase. (In Russian.) S. R. Rafikov and B. V. Suvorov. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 21, 1952, p. 415-417.

Discusses the above on the basis of recent Russian and American literature.

7865* Mechanism of Catalytic Dehydrocyclization of Paraffin Hydrocarbons. (In Russian.) M. Ia. Kagon, L. A. Erivanskaia, and I. V. Trofimova. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 21, 1952, p. 913-916.

Discusses the above on the basis of experimental and theoretical investigation. Data are tabulated.

7866* Synthesis of Silicon Organic Compounds from Methylene Chloride and Silicon. (In Russian.) A. V. Topchiev, N. S. Nametkin, and V. I. Zetkin. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 21, 1952, p. 927-929.

The effect of temperature and other variables on the above was studied. Data are tabulated and charted.

7867 Studies on the Catalytic Reduction of Acetone. Lewis Friedman and John Turkevich. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1669-1671.

Catalytic reductions of acetone to propane and isopropyl alcohol were investigated using deuterium. A mechanism involving direct addition of deuterium is favored in both reactions. The synthesis of $(CH_3)_2$ by this method is not possible because of exchange of detuterium with an intermediate in the reduction process. Conditions were found for the synthesis of $(CH_3)_2CDOD$.

7868 The Reaction of Cyanogen and Related Nitriles With 1,3-Dienes. III. Kinetic Study of the Cyanogen—Butadiene Cyclization Reaction. P. J. Hawkins and G. J. Janz. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1790-1793.

15 references.

7869 The Influence of Nitro Compounds on the Catalytic Exchange Reaction Between Deuterium Gas and Acetic Acid. Evidence for the Mechanism of the Catalytic Hydrogenation of Nitro Groups. Lloyd E. Line, Jr., Betty Wyatt, and Hilton A. Smith. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1808-1811.

7870 Allylic Chlorides. XVI. Copper(I) Chloride Catalyzed Acid Hydrolysis of the 1,3-Dichloropropenes Containing Cl^{36}. Lewis F. Hatch, Leon O. Morgan, and Virgil L. Tweedie. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1826-1829.

13 references.

7871 The Aromatic Elimination Reaction. II. The Mechanism of the Acid-Catalyzed Deacylation of Aromatic Ketones. W. M. Schubert and H. K. Latourette. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1829-1834.

17 references.

7872* Dilatometric Studies of Pure Triglycerides and Mixtures. B. M. Craig, W. O. Lundberg, and W. F. Geddes. *Journal of the American Oil Chemists' Society*, v. 29, Apr. 1952, p. 128-133.

Reports were undertaken to extend the available information on the coefficients of expansion and melting dilations of individual triglycerides, and to determine the effects of triglyceride composition on the melting range, and on the proportion of solids within the melting range, in synthetic mixtures of pure triglycerides.

7873* Dilatometric Investigations of Fats. VI. Melting Dilation as a Function of Chain Length in Fatty Acids and Their Glyceryl Esters. W. S. Singleton and Audrey T. Gros. *Journal of the American Oil Chemists' Society*, v. 29, Apr. 1952, p. 149-151.

10 references.

7874* Thermal Properties of Fats and Oils. VIII. Specific Heats, Heats of Fusion, and Entropy of Alpha and Beta Tung Oils. T. L. Ward, W. S. Singleton, and R. W. Planck. *Journal of the American Oil Chemists' Society*, v. 29, Apr. 1952, p. 155-157.

10 references.

7875* The Guerbet Reaction and Its Technical Importance. (In German.) H. Machemer. *Angewandte Chemie*, v. 64, Apr. 21, 1952, p. 213-220.

The chemistry of the alkaline condensation of alcohols via carbonyl compounds was investigated. It was possible to improve the yield to 80%, which makes the reaction technically important. Fat alcohol from fore runnings was used to prepare higher-molecular-weight alcohols whose water-soluble derivatives have valuable surface-active properties. 36 ref.

7876* Study of Ternary Fatty Acid Mixtures. (In French.) **VII. Solidification Points of Mixtures of Capric, Lauric, and Myristic Acids.** C. Paquot and J. Petit. **VIII. Solidification Points of Mixtures of Lauric, Myristic, and Palmitic Acids.** C. Paquot, J. Mercier, and J. Petit. *Bulletin de la Société Chimique de France*, Jan.-Feb. 1952, p. 139-140.

7877* A New Method of Separation of Organic Substances: Chromatography in the Liquid Phase or Craig Countercurrent Method. (In French.) D. Pillon. *Bulletin de la Société Chimique de France*, Jan.-Feb. 1952, p. D1-D9.

Discusses the above with respect to obtaining chemically pure substances, the process and its theory, limitations and conditions of use, and apparatus. Graphs and diagrams. 20 ref.

7878* Liquid Organic Uranium Compounds. (In German.) Henry Albers, Martin Deutsch, Walter Krastinat, and Horst von Osten. *Chemische Berichte*, v. 85, no. 4, 1952, p. 267-278.

Alcoholates, 1,3-diketone complexes, and complex alkoxy compounds of quadrivalent uranium were prepared. Fluidity and solubility properties were determined. 29 ref.

27. *Chemistry—Organic*

7879* Preparation of Alkylammonium Uranyl Dithiocarbamates From Quadrivalent Uranium Compounds. (In German.) Henry Albers and Siegfried Lange. *Chemische Berichte*, v. 85, no. 4, 1952, p. 278-285.

7880* A New Method for Preparation of Long-Chain Carboxylic Acids. Report II. Simplified Process for Preparing Long-Chain Carboxylic Acids. (In German.) Hermann Stetter and Wolfgang Dierichs. *Chemische Berichte*, v. 85, no. 4, 1952, p. 290-292.

Procedure described is applied to preparation of caproic, caprylic, suberic, and undecane-1,11-dicarboxylic acid.

7881* Kinetics and Reaction Mechanism of the Formaldehyde Condensation. (In German.) Emanuel Pfeil and Günther Schroth. *Chemische Berichte*, v. 85, no. 4, 1952, p. 293-307.

Influence of alcohols, glycols, glycerine, glucose, dioxane, and tetrahydrofuran was investigated. 17 ref.

7882 The Thermal Degradation of Polyvinyl Acetate. I. Products and Reaction Mechanism at Low Temperatures. N. Grassie. *Transactions of the Faraday Society*, v. 48, Apr. 1952, p. 379-387.

20 references.

7883* Complexone XXII. Kinetics of Complex Formation: Exchange of Y^{-4} Between Cd^{+2} and Cu^{+2}. (In German.) H. Ackermann and G. Schwarzenbach. *Helvetica Chimica Acta*, v. 35, no. 2, 1952, p. 485-497.

Mechanism of the reaction between cupric ion and the Cd complex of ethylenediamine tetraacetic acid (H_4Y) was studied. The reaction proceeds simultaneously via 4 different reaction paths brought about through the collision of the cation Cu^{+2} with the anions CdY^{-2}, $CdHY^{-}$, HY^{-3}, H_2Y^{-2}, which are in permanent equilibrium with each other. Rate constants of these 4 bimolecular reactions are evaluated and discussed. Graphs and tables. 19 ref.

7884 Reactions of Unsaturated Compounds With Iodine-Amine Complexes. I. Reactions of Benzalacetophenone and Benzalacetone. Philip L. Southwick and David R. Christman. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 1886-1891.

22 references.

7885 The Interaction of Iodine and Bromine With Organic Halides. R. M. Keefer and L. J. Andrews. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 1891-1893.

A study of ultraviolet absorption spectra of solutions of the above indicate that coordination complexes are formed. Spectrophotometric data were used to evaluate equilibrium constants for the coordination reactions. Graphical and tabular data. 10 ref.

7886 Spontaneous Ignition of Organic Compounds. Charles E. Frank and Angus U. Blackham. *Industrial and Engineering Chemistry*, v. 44, Apr. 1952, p. 862-867.

Reports some results obtained in a study being conducted for the NACA at Applied Science Research Laboratory, University of Cincinnati. The broad objective is development of information which will permit formulation of lubricants of reduced flammability. Specific objectives have been to determine effects of structure on ease of spontaneous ignition, and influence of metal catalysts and various additives on these temperatures. 22 ref.

7887* Organic Fluorides. X. The Formation of Fluoro-Oils and Resins by the Polymerization of Hydrofluorocarbons With Fluorine. F. Smith, M. Stacey, J. C. Tatlow, J. K. Dawson, and B. R. J. Thomas. *Journal of Applied Chemistry*, v. 2, Mar. 1952, p. 97-105.

19 references.

7888* The Biological and Therapeutic Significance of Organic Phosphates Occurring in Nature. F. Bergel. *Journal of Applied Chemistry*, v. 2, Mar. 1952, p. 110-120.

Discusses the above on the basis of a survey of the literature. 76 ref.

7889* The Fluorination of Hydrocarbons With Cobalt Trifluoride. A. K. Barbour, G. B. Barlow, and J. C. Tatlow. *Journal of Applied Chemistry*, v. 2, Mar. 1952, p. 127-133.

An apparatus for carrying out this type of reaction, and also a convenient cell for the generation of fluorine, are described. The syntheses of some of the raw materials are described. 20 ref.

7890* Exchanges of Iodine Between Allyl Iodide and Sodium Iodide. Value of Activation Energy. (In French.) S. May, P. Daudel, J. Schottey, M. Sarraf, and A. Vobaure. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 49, Feb. 1952, p. 64-67.

Includes tables, charts, and apparatus diagrams.

7891* Mechanism of Slow Thermal Oxidation of Organic Substances in the Gaseous Phase. (In French.) Michel Niclause. *Journal de Chimie physique et de Physico-Chimie biologique*, v. 49, Mar. 1952, p. 157-161.

Simple mechanism for the above, involving two processes for chain propagation: bimolecular reaction between RH and O_2; and slow monomolecular decomposition of hydroperoxides of the RO_2H type. The case of CH_3CHO is cited as an example. 14 ref.

7892* Amide Interchange Reactions. L. F. Beste and R. C. Houtz. *Journal of Polymer Science*, v. 8, Apr. 1952, p. 395-407.

Presents results of a study undertaken to answer the following questions: Can copolyamides be prepared from small molecules containing preformed amide links without disrupting these kinds? If amide interchange is a reality, what are the kinetics of the reaction? Can amide interchange be used to prepare polyamides?

7893* Molecular Weight Degradation of Polyvinyl Acetate on Hydrolysis. O. L. Wheeler, S. L. Ernst, and R. N. Crozier. *Journal of Polymer Science*, v. 8, Apr. 1952, p. 409-423.

Presents results of, and discusses, research conducted in an attempt to clarify some of the seemingly contradictory evidence presented on the above. 22 ref.

7894* Dynamic Studies on Polymeric Liquids. R. C. Harper, Jr., H. Markovitz, and T. W. DeWitt. *Journal of Polymer Science*, v. 8, Apr. 1952, p. 435-443.

The dynamic properties of low-molecular-weight polyisobutylene and silicone oils were investigated over a range of frequencies and temperatures. Dynamic viscosities and rigidities were determined at frequencies between 10 and 100 cycles per sec. and at temperatures between −50° and +60°C. Falling-ball viscosities were also obtained over the same temperature range. 14 ref.

7895 Addition of Iodine (I) 3,5-Dinitrobenzoate to Simple Olefins. Bernard I. Halperin, Hugh B. Donahoe, Jacob Kleinberg, and Calvin A. Vanderwerf. *Journal of Organic Chemistry*, v. 17, Apr. 1952, p. 623-629.

A study on above in reference to olefin identification. 17 ref.

7896 Symmetrical Bi-Aromatics. George N. Jean, Louis J. Owen, and F. F. Nord. *Nature*, v. 169, Apr. 5, 1952, p. 585.

An investigation of the possible existence of optical activity in the β-phenylthiophenes.

7897 The Kinetics of Polysulphone Formation. I. The Formation of 1-Butene Polysulphone at 25°C. F. S. Dainton and K. J. Ivin. *Proceedings of the Royal Society*, ser. A, v. 212, Apr. 8, 1952, p. 96-112.

The formation of 1-butene polysulfone from mixtures of liquid SO_2 and 1-butene was investigated dilatometrically at 25°C. Kinetic expressions are deduced for various possible termination mechanisms.

7898* Reaction Products of Primary β-Hydroxy-Amines with Carbonyl Compounds. (In English.) Ernst D. Bergmann, S. Pinchas, E. Zimkin, V. Hirshberg, E. Meeron, Ernst Fischer, Jacques Metzer, and A. Pacault. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Feb., 1952, p. 161-260.

A series of 7 articles, each being by 1, 2, or 3 of the above listed authors. Numerous references.

7899* Thermal Quantities of Some Cycloparaffins. Part III. Results of Measurements. (In English.) Sj. Kaarsemaker and J. Coops. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Feb. 1952, p. 261-276.

Heats of combustion, melting points, heats of fusion, boiling points, refractive indices and, in 4 cases, densities were determined on selected samples of the cyclanes with 4 to 9 C-atoms; some hitherto unknown transition points were discovered and the heats of transition measured. Heats of vaporization at 25° C. are estimated. 51 ref.

7900 The Effective Equivalent Weights of Some Rosin Acids and Soaps. S. H. Maron, B. Madow, and E. Borneman. *Rubber Age*, v. 71, Apr. 1952, p. 71-72.

A number of commercial resins and dresinates were analyzed by conductometric titration for soap and rosin acid, as well as moisture. The acids included were Resin 731 and K-wood rosin, while the soaps were Dresinates 731, 214, 87, 89, and 90. From the data obtained, the effective equivalent weights of the acids and soaps involved were calculated.

7901* Organic Derivatives of Phosphorous Acid. (In Russian.) A. E. Arbuzov. *Uspekhi Khimii*, v. 20, Sept.-Oct. 1951, p. 521-532.

Presents a detailed discussion of the above. 36 ref.

7902* Properties and Chemical Reactions of Cyclopentadiene. (In Russian.) E. M. Terent'eva and A. F. Plate. *Uspekhi Khimii*, v. 20, Sept.-Oct. 1951, p. 560-588.

A review. 317 ref.

7903* Catalytic Hydrogenation of Furan Compounds and Its Significance in Organic Synthesis. (In Russian.) A. A. Ponomarev and V. V. Zelenkova. *Uspekhi Khimii*, v. 20, Sept.-Oct. 1951, p. 589-620.

Discusses the above from the view point of the potential uses of furfural as an industrial raw material. 279 ref.

7904* Contribution of Russian Chemists to the Development of Magnesium-Organic Syntheses. (In Russian.) S. T. Ioffe. *Uspekhi Khimii*, v. 20, Sept.-Oct. 1951, p. 621-656.

A review. 331 ref.

7905* Density Measurements. XV. Change of Volume in the Melting of Homologous Hydrocarbons from $C_{20}H_{42}$ to $C_{24}H_{50}$. (In German.) Horst Sackmann and Peter Venker. *Zeitschrift für physikalische Chemie*, v. 199, Jan. 1952, p. 100-113.

Describes experimental procedure. Discusses results and the problem of alternation. Graphs, tables, and diagrams. 23 ref.

7906* Transformation of Olefinic Hydrocarbons in the Presence of Metal Silicate Catalysts. III. The Transformation of Certain Unsaturated Hydrocarbons With Quaternary Carbon Atoms by Aluminosilicate Catalysts. (In Russian.) R. D. Obolentsev and N. N. Griazev. *Zhurnal Obshchei Khimii*, v. 21(83), Sept. 1951, p. 1588-1602.

24 references.

7907* Influence of Boron Fluoride on the Cracking of Hydrocarbons. (In Russian.) Ia. M. Paushkin and Iu. S. Lipatov. *Zhurnal Obshchei Khimii*, v. 21(83), Oct. 1951, p. 1794-1799.

A laboratory study was made of the above. Data are tabulated and charted.

7908* The Transformation of Hydrocarbons in the Presence of Oxide Catalysts. IV. Dehydrogenation of Butanes by Chromium Catalysts. (In Russian.) P. D. Obolentsev, K. A. Vershinina, and E. V. Skvortsova. *Zhurnal Obshchei Khimii*, v. 21(83), Oct. 1951, p. 1800-1806.

Tables and graphs. 27 ref.

7909* Study of the Composition of Fatty Acids From Oxidized Paraffins. (In Russian.) A. E. Drabkin and Z. V. Soloveichik. *Zhurnal Prikladnoi Khimii*, v. 24, May 1951, p. 502-508.

Miscellaneous Publications

7910 The Production of Organic Acids by Fermentation; The Technical Literature and Patents of the U. S. Department of Agriculture. Robert G. Dworschack, compiler. Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture, AIC-322, Feb. 1952, 9 pages. (S584 Un3aoi)

7911 High Poymers. Vol. VIII. Copolymerization. Turner Alfrey, Jr., John J. Bohrer, and H. Mark. 269 pages. 1952. Interscience Publishers, Inc., New York. (QD281.P6 AL26c)

Analyzes in detail the reaction mechanism of copolymerized systems. Emphasis is placed on investigating composition and structure, especially monomer distribution, in such systems. Resonance and polymerization problems particularly are taken into account. The aim is to arrive at rules for the tailoring of copolymers of a desired structure and for establishing a relationship between the proportion of the monomers and the steering of the copolymerization process to the properties of the final products.

7912 Progress in Organic Chemistry. Vol. 1. J. W. Cook. 287 pages. 1952. Academic Press Inc., New York. (QD251 P94)

Presents, in a concise but adequate form, descriptions of recent developments in selected fields of organic chemistry. Covers strychnine, brucine, vomicine, heartwood constituents of conifers, photodynamically-active natural pigments, chemicals from petroleum, acetylene, drugs inhibiting symptomatic stimulators, and starch and its products. Each of the contributors is an active worker in the field which he has reviewed. Chapter bibliography.

7913 The Essential Oils. Ernest Guenther. 507 pages. 1952. D. Van Nostrand Co., New York (TP680 G93e)

Describes the production, physicochemical properties, chemical composition, and uses of individual essential chemical composition, and uses of individual essential oils. These oils are grouped within the botanical families to which the corresponding plants belong.

7914 Thiophene and Its Derivatives. Howard D. Hartough. 533 pages. 1952. Interscience Publishers, Inc., New York. (QD403 H25t)

A series of monographs devoted to a modern detailed and comprehensive presentation of heterocyclic chemistry by a group of authorities. The subdivisions are designed to cover the field in its entirety by monographs which reflect the importance and the interrelations of the various compounds.

7915 Die Antibiotica: Grundzüge der Chemie und Physiologie der mikrobiellen Hemmstoffe. (Antibiotics: Principles of the Chemistry and Physiology of Microbial Inhibitors.) Hans Vogel. 528 pages. 1951. Verlag Hans Carl, Nuremberg, Germany. (RS161 V86a)

Discusses micro-organisms such as bacteria, fungi, algae, lichen, protozoa, viruses, and phages. chemistry and physics of their production and properties (including modern "wonder drugs"); and their effects on animal organisms. Includes tables, a list of patents, and numerous references.

See also:
7862 ("Solubilities of Organic Compounds"—book)
7886 (lubricants of reduced flammability)
8018 (amino resins for coatings)

28. PLASTICS AND HIGH POLYMERS

7916* Certain Regularities in the Copolymerization of Diisocyanate With Glycol. (In Russian.) V. V. Korshak and I. A. Gribova. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 21, 1952, p. 397-400.

Data on the above are charted, tabulated and discussed. Most of the product falls in the molecular-weight range 5000-25,000. 10 ref.

7917* Significance of Exchange Reactions in the Process of Polycondensation. (In Russian.) V. V. Korshak, G. N. Chelnokova, and G. I. Distler. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 1952, p. 589-591.

Discusses the above as applied to production of high polymers of various types.

7918 The Specific Heat and Degree of Crystallinity of Polychlorotrifluoroethylene. John D. Hoffman. *Journal of*

28. *Plastics and High Polymers*

the American Chemical Society, v. 74, Apr. 5, 1952, p. 1696-1700.

Specific heats of slow-cooled and air-quenched samples of the above were measured between 0 and 250°C. in a differential calorimeter. 11 ref.

7919 Polymerizable Derivatives of Long-Chain Fatty Acids. VI. Preparation and Applicability of Urea Complexes of Vinyl Esters. Daniel Swern and William S. Port. *Journal of the American Chemical Society*, v. 74, Apr. 5, 1952, p. 1738-1739.

Shows that vinyl esters of long-chain fatty acids form urea complexes in good to excellent yield (56-99%.) The technique of urea-complex formation should be useful in a variety of polymerization and preparation investigations involving monomers which contain long chains.

7920 Preparation and Polymerization of Unsaturated Quaternary Ammonium Compounds. III. Vinyloxethyl Derivatives. George B. Butler and Robert L. Goette. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 1939-1941.

15 references.

7921 Intrinsic Viscosities of Polystyrene Fractions in a Variety of Solvents. A Test of the Flory-Fox Treatment. L. H. Cragg, T. E. Dumitru, and J. E. Simkins. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 1977-1979.

A study of the above involving 12 solvents at several temperatures in the range 15-65°C. Graphical and tabular data.

7922 The Dehalogenation Reaction. II. Dechlorination of Vinyl Chloride Copolymers. Turner Alfrey, Jr., Howard C. Haas, and Charles W. Lewis. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2025-2027.

7923 Kinetics of the Polymerization of Methyl Methacrylate With Aliphatic Azobisnitriles as Initiators. L. M. Arnett. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2027-2031.

18 references.

7924 Vinyl Polymerization With Radioactive Aliphatic Azobisnitrile Initiators. L. M. Arnett and J. H. Peterson. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2031-2033.

A study of the above using C^{14} to determine initiator efficiency. This ranged from about 50% for methyl methacrylate to about 100% for acrylonitrile.

7925 Association of Polystyrene in Non-Polar Solvents. O. A. Trementozzi, R. F. Steiner, and Paul Doty. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2070-2073.

Presents an investigation on the above for a polystyrene sample which previously had been found to exhibit anomalous behavior in osmotic-pressure studies. Tables and graphs.

7926 Methyl Vinyl Sulfoxide. Copolymerization and Spectra. Charles C. Price and Richard D. Gilbert. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 2073-2074.

Presents tabular data and a discussion on the above. The conjugative properties of the sulfoxide group are unexpectedly low. 12 ref.

7927* The Continuous Dyeing of New Synthetic Fibers. Edward H. Gamble. *American Dyestuff Reporter*, v. 41, Apr. 14, 1952, p. 223-241.

Presents, in detail, an investigation conducted to develop continuous dyeing methods for fabrics composed of the new synthetic fibers, Dacron, Orlon, Acrilan and Dynel. A study of the influence of heat was made on a number of dyes. Preliminary experiments showed promising results with vat dyes and their leuco esters. Most of the subsequent work was devoted to these classes of dyes. Several original and practical processes were developed and successful plant trials were made. 30 ref.

7928 Plastics Equipment and Technique. Denis A. Dearle. *American Machinist*, v. 96, Apr. 28, 1952, p. 107-122.

A general survey of the equipment and tooling in the plastics field: presses, molds, molding techniques, product design, and finishing. An introduction to the mutual areas in which metalworking and plastics must work together: tools and equipment.

7929* The New and Old in Synthetic Fibers. *Analysts Journal*, v. 8, Jan. 1952, p. 58-69.

A verbatim report of speeches presented at the Eastern Regional Conference, New York Society of Security Analysts. General topics are "Man-Made Fibers: Their Basic Raw Materials and Their Impact on the Economic Development of These Fibers"; "Properties and Future of Synthetic Fibers"; and "Textile Mills Keep Pace With Fiber Developments".

7930* On the Clarification of the Constitution of Macromolecular Plastics. (In German.) H. Staudinger. *Angewandte Chemie*, v. 64, Mar. 21, 1952, p. 149-158.

Because of the polymolecularity of the macromolecular plastics and the influence of small, technically uncontrollable test deviations, it is almost impossible to obtain synthetic plastic and fibrous materials with completely uniform properties. The special features of macromolecular chemistry in contrast to low-molecular and colloidal chemistry are shown, using identification, purification, shape-alteration, and constitutional determination as examples. 73 ref.

7931 Measurement of Residual Stress in Thermosetting Plastics. Russell DeWaard, Charles R. Stock, and Turner Alfrey, Jr. *ASTM Bulletin*, Apr. 1952, p. 53-59.

Method is presented for determining the distribution of residual stresses through the thickness of molded thermosetting plastics. Stress analysis is based upon the bending produced by milling into one surface of narrow strips. 13 ref.

7932 Impact Strength of Some Thermosetting Plastics at Low Temperatures. John J. Lamb, Desmond A. George, Harriet A. Baker, and L. E. Seiffert. *ASTM Bulletin*, Apr. 1952, p. 67-70.

Izod impact specimens of 5 types of laminates were stored for various periods, and were tested at the storage temperatures. No effect of time of storage at low temperature on impact strength at low temperature was observed.

7933* Molded Wings. *Aviation Age*, v. 17, Apr. 1952, p. 46-53.

Describes the forming of plastic and metal wings. Tabular data give strength and property comparisons.

7934* Welding of Nonmetallic Materials. (In Russian.) I. I. Makarov. *Avtogennoe Delo*, v. 22, Oct. 1951, p. 25-27.

Vinyl plastic specimens were welded using a gas torch. The joints were found to have about 40% of the tensile strength of the base material and became very weak and brittle in bending and impact tests. Data are tabulated and illustrated.

7935 The Colouring of Polystyrene Moulding Material. S. D. Eagleton and H. B. Kingsley. *British Plastics*, v. 25, Apr. 1952, p. 120-125.

Describes above covering the 2-roll mill, extrusion, and dry-coloring processes; coloring materials; and color matching.

7936 Close Process Control Puts Vicara Over. *Chemical Engineering*, v. 59, Apr. 1952, p. 224, 226-229.

Describes production of this new synthetic protien-base fiber. Compares its properties with those of wool. Flow diagram.

7937 The Athermal Entropy of Mixing of Polymer Solutions. H. Tompa. *Transactions of the Faraday Society*, v. 48, Apr. 1952, p. 363-367.

An expression is derived for the above. It is expected to be valid, with the usual assumptions of lattice theory, not only for linear polymers, but for polymers occupying more than single connected sets of sites.

7938 Construction, Calibration and Use of a Light Scattering Apparatus For the Study of Macromolecules in Solution. D. A. I. Goring and P. Johnson. *Transactions of the Faraday Society*, v. 48, Apr. 1952, p. 367-379.

A critical examination of light scattering as a primary method

for the estimation of the size of macromolecules in solution is reported.

7939 Wool's Battle With the Synthetics. *Fortune*, v. 45, May 1952, p. 128-131, 144, 147, 148, 152.

A general discussion of synthetic fibers. Chart presents information on raw materials, manufacturers qualities, limitations, uses, production, and price of various synthetic materials.

7940 Use of Beryllium Copper in Plastic Molds. Malcolm A. Nichols. *India Rubber World*, v. 126, Apr. 1952, p. 80-81.

Describes the above, covering pressure casting of the molds, properties of the molds, types of hobs, advantages of using Be-Cu, and applications other than for plastic molds.

7941 Light Stability of Polystyrene and Polyvinylidene Chloride. L. A. Matheson and R. F. Boyer. *Industrial and Engineering Chemistry*, v. 44, Apr. 1952, p. 867-874.

Fundamental reasons for yellowing and loss of strength of polystyrene and polyvinylidene chloride during exposure to light were investigated. Improved products were developed. Data are charted and discussed. 37 ref.

7942 Basic Degree of Polymerization of Cellulose Acetate. L. A. Cox and O. A. Battista. *Industrial and Engineering Chemistry*, v. 44, Apr. 1952, p. 893-896.

A procedure for measuring intrinsic viscosity and/or average basic degree of polymerization of cellulose acetates by their simultaneous solution and complete deacetylation in cuprammonium hydroxide solvent is described. The method was applied to studies involving preparation of cellulose acetates having a wide spread of acetic acid yields and varying compatibilities in organic solvents. Viscosity data for cellulose acetates dissolved in various organic solvents are compared with results obtained for the corresponding regenerated celluloses in cuprammonium hydroxide. A convenient method for converting a single-solution viscosity of cellulose acetates into basic degress of polymerization based on the cuprammonium hydroxide solvent procedure is given in the form of a calibration curve. A practical proved method for measuring relative chain length of any cellulose acetate was established. Expression of chain length in terms of "basic degree of polymerization" is recommended in lieu of measured units. 14 ref.

7943 Thermal Conductivity of Anisotropic Materials. Jerome Freiling, Roger E. Eckert, and J. W. Westwater. *Industrial and Engineering Chemistry*, v. 44, Apr. 1952, p. 906-910.

In order to measure the directional thermal conductivities of plastics, an unsteady-state method was devised. The results are useful for establishing molding techniques for plastics, and they also provide design data for plastics used as heat insulators. 24 ref.

7944* The Melt-Viscosity of Some Phenol-Formaldehyde Novolak Resins. T. T. Jones, *Journal of Applied Chemistry*, v. 2, Mar. 1952, p. 134-149.

Melt-viscosity and density of the above molecular weights varying between 400 and 900 were studied in the range 100-250°C. Graphs and tables. 29 ref.

7945 On the Dependence of the Average Polymer Molecular Weight on the Change in the Particle Diameter of a Homogeneous Monomer Emulsion. G. Narsimhan. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 489-491.

Theoretical. Two new equations are proposed for the determination of the average polymer molecular weight during the polymerization of a soap-stabilized monomer emulsion.

7946 A Contribution to the Knowledge of Some Physico-Chemical Properties of Polystyrene. Nils Gralen and Gosta Lagermalm. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 514-523.

Concerns a fractionated and several unfractionated samples of polystyrene. A method for "graphical fractionation" is described, and the result compared with that from a summation method based on investigation of individual fractions. Discusses degree of branching, effect on weights and shapes of molecules of alterations in polymerization conditions, and factors affecting formation of maxima in the sedimentation diagram. Tables and sedimentation diagrams. 21 ref.

7947* A Generalization of the Statistical Theories of High Polymer Solutions. (In French.) Arnold Munster. *Journal de Chimie physique et de Physico-Chimie biologique*, v. 49, Mar. 1952, p. 128-139.

Discusses the differences between the Flory-Huggins, Miller-Guggenheim, and Orr-Guggenheim theories, and experimental results. Proposes a generalization of these theories which takes into consideration internal mobility of the chain molecules and orientation of the molecules of the solvent. Graphs. 46 ref.

7948* Ultraviolet-Ray Absorption of High Polymers. (In German.) G. Scheibe and R. Fauss. *Kolloid Zeitschrift*, v. 125, Mar. 1952, p. 139-148; disc., p. 148-149.

Describes apparatus for determining above as a convenient and rapid method of analyzing synthetic and natural high-polymers for impurities and composition. Includes diagrams and graphs. 49 ref.

7949* To What Extent Is It Possible to Recognize the Basic Correlation Between Composition and Physical Behavior of Phenol Resins? (In German.) Hans Friedrich Müller and Isolde Müller. *Kunststoffe*, v. 42, Mar. 1952, p. 57-63.

Shows that internal structure of phenol resins is dependent on properties and quantitative distribution of the resin constituents. The effect of production conditions on resin structure was analytically investigated and it is shown on acid-hardening phenol resins that composition affects hardening processes and quality of product. Table and graphs.

7950* Testing the Heat Resistance of Shoe-Sole Adhesives. (In German.) Eugen Bock. *Kunststoffe*, v. 42, Mar. 1952, p. 67-68.

Describes and illustrates apparatus and procedure. Typical data are charted.

7951* Synthetic-Resin Determination Table. (In German.) Hansjürgen Saechtling. *Kunststoffe*, v. 42, Mar. 1952, p. P21-P25.

Table shows qualitative tests for systematic determination of composition of the above.

7952* Fractionation and Molecular-Weight Determination of Polyethylene. (In German.) Kurt Ueberreiter, Hans-Joachim Orthmann, and Günter Sorge. *Makromolekulare Chemie*, v. 8, Apr. 1952, p. 21-40.

Apparatus for fractionation at 80°C. 8 different polyethylenes were fractionated and molecular weights determined by cryoscopic, osmotic, and viscometric methods. 11 ref.

7953* Substituted Polyesters. IV. Report on Polyesters. (In German.) H. Batzer and F. Wiloth. *Makromolekulare Chemie*, v. 8, Apr. 1952, p. 41-71.

Substituted polyesters were prepared in the molten state and in solution from α,α'-dibutylsebacic acid or β,β'-dibutylsebacic acid or hexanediol. Molecular weights of fractions were determined by several independent methods. Physical properties are described. 74 ref.

7954* Kinetics of Polycondensation of Phenol Alcohols. (In German.) Hermann Kämmerer. *Makromolekulare Chemie*, v. 8, Apr. 1952, p. 72-84.

After a review of kinetics of methods of phenolic-resin formation and their results, it is demonstrated from the reaction curves of phenol alcohols, that the kinetics of condensation developed by P. J. Flory for polysterification reaction is applicable to polyesterification of phenol alcohols. 61 ref.

7955* Polycondensation of p-Cresol Dialcohols. (In German.) Hermann Kämmerer. *Makromolekulare Chemie*, v. 8, Apr. 1952, p. 85-97.

Shows that the above takes place in the same manner in platinum or silver vessels and crucibles, and depends mainly on purity of the p-cresol dialcohol. Rate of condensation in air is different than in nitrogen. 12 ref.

7956* Catalytic Effects on the Polycondensation of p-Cresol Dialcohols. (In German.) Hermann Kämmerer. *Makromolekulare Chemie*, v. 8, Apr. 1952, p. 98-109.

Effects of small amounts of sodium impurity were investigated. Loss of weight and formaldehyde during condensation in Pt and Ag vessels increases with proportion of Na present.

28. *Plastics and High Polymers*

7957* Plastics in Your Plant. *Modern Industry*, v. 23, Apr. 15, 1952, p. 50-53.

Pictorial account showing manufacture and varied use of plastics for plant equipment.

7958 Progress Report on Plastics Pipes. *Modern Plastics*, v. 29, May 1952, p. 75-82.

Sources and applications of saran, polyethylene, butyrate, styrene copolymer, reinforced polyester, and hard vinyl pipes. Photographs.

7959 Foamed Vinyl From Open Molds. *Modern Plastics*, v. 29, May 1952, p. 83.

Describes production and properties. Based on Vinylite plastisol resins, developed by Elastomer Chemical Co., Nutley, N. Y.

7960 Current Techniques for the Injection Molding of Nylon. L. Paggi. *Modern Plastics*, v. 29, May 1952, p. 101-104, 106, 108, 192.

Describes injection machine, mold design, molding operation, and safety precautions. Tabular data on factors affecting molding dimensions. Equipment diagrams.

7961 Role of Hydrogen Chloride in PVC Degradation. Abb L. Scarbrough, W. L. Kellner, and P. W. Rizzo. *Modern Plastics*, v. 29, May 1952, p. 111-112, 114, 116, 118, 120, 122.

Describes experimental method. Also considers effects of oxygen, heat, and light. Graphs. 12 ref.

7962 Exotherm Curves For Cold-Setting Polyester Resins. F. S. Nichols and C. H. Bliss. *Modern Plastics*, v. 29, May 1952, p. 124, 194, 197, 199-200, 203-204.

Above show the course and amount of heat liberation during curing of resins. Advantages of their use. Typical examples. Tables and graphs.

7963* Thermal and Photodegradation of Vinyl Polymers. Robert Simha. *Transactions of the New York Academy of Sciences*, ser. 2, v. 14, Feb. 1952, p. 151-157.

Discusses fundamentals of above theory with limitation to systems with a breakdown of the chain backbone. Thus excludes a study of systems such as polyvinyl chloride, where the main process consists of a removal of pendant groups. Graphs and tabular data. 14 ref.

7964* Building With Honeycomb Plastics. George May. *Plastics*, v. 17, Apr. 1952, p. 92-94, 91.

Describes developments in France. Illustrated.

7965* Airless Blast Equipment for Deflashing. L. J. Wieschhaus. *Plastics Industry*, v. 10, Apr. 1952, p. 14-15.

Describes process for plastics in which the molded parts are bombarded with millions of tiny pellets which seek out the flash and break it off by impact. The pellets used are of a relatively soft, non-abrading nature. The material in most common use is crushed apricot pits, although pecan shells, walnut shells, and other similar materials have been used on occasion.

7966 Foam Plastics as Engineering Materials. *Product Engineering*, v. 23, Apr. 1952, p. 192-198.

An illustrated review of properties and applications of the above.

7967* Reactions of Polypeptide Esters in the Solid State. II. A Few Cases of Prevailing Polycondensation. Remarks Concerning the Reaction Mechanism. (In English.) L. A. Ae. Sluyterman and M. Kooistra. *Recueil des Travaux Chimiques des Pays-Bas*, v. 71, Feb., 1952, p. 277-284.

When tetraglycine methyl ester is heated at 185°C. in the solid state or at 100°C. dissolved in methanol, polymers containing small amounts of sarcosyl units are formed. Also polymers obtained by heating triglycine methyl ester at 100-185°C. partly consisted of sarcosyl units.

7968 The Copolymerization of Styrene and Sulphur Dioxide. II. The Kinetics of Polymerization. W. G. Barb. *Proceedings of the Royal Society*, v. 212, ser. A, Apr. 22, 1952, p. 177-192.

A study dealing with measurements of the photochemical rate of reaction under various conditions. Apparatus diagrams, graphs, and tables. 20 ref.

7969 The Kinetics of Polysulphone Formation. II. The Formation of 1-Butene Polysulphone in the Region of the Ceiling Temperature. F. S. Dainton and K. J. Ivin. *Proceedings of the Royal Society*, v. 212, ser. A, Apr. 22, 1952, p. 207-220.

A study of the above extending previous experiments to higher temperatures and elucidating the cause of the "ceiling temperature", which is the temperature above which reaction rate and molecular weight of polymer formed are very small. Graphs. 12 ref.

7970 Molding of Heavy Sections. Gordon Thayer. *SPE Journal*, v. 8, Apr. 1952, p. 5-11.

Requirements for successful molding of heavy sections. Common faults in thick moldings and their causes.

7971* Influence of Electrical Discharges on the Behavior of High Polymers. (In German.) Werner Kuhn. *Zeitschrift für angewandte Physik*, v. 4, Mar. 1952, p. 108-119.

Fundamental treatment of the above. Diagrams and graphs. 28 ref.

7972* Polymerization of Ring-Substituted Halogen Derivatives of Styrene. I. (In Russian.) M. M. Koton, E. P. Moskvina, and F. S. Florinskii. *Zhurnal Obshchei Khimii*, v. 21(83), Oct. 1951, p. 1847-1852.

Results obtained with 7 monomers of above type are tabulated, charted, and discussed.

7973* Copolymerization of Vinylacetate and Maleic Anhydride and Properties of the Resulting Copolymers. (In Russian.) S. N. Ushakov, S. P. Mitsengendler, and V. A. Chekhovskaya. *Zhurnal Prikladnoi Khimii*, v. 24, May 1951, p. 485-489.

7974* Molecular Composition of Chlorinated Polyvinyl Chlorides. (In Russian.) G. E. Geller. *Zhurnal Prikladnoi Khimii*, v. 24, Oct. 1951, p. 1058-1062.

Experiments were made on the molecular-weight distribution of the above. Tables and graphs.

7975* The Viscosity Properties of Polymers of Vinylalkyl Esters. (In Russian.) M. F. Shostakovskii, B. V. Deriagin, I. F. Bogdanov, and N. N. Zakhavalva. *Zhurnal Prikladnoi Khimii*, v. 24, Oct. 1951, p. 1063-1070.

Tables and graphs.

7976* Analysis of Copolymers of Methylmethacrylate and Allylmethacrylate. (In Russian.) B. N. Rutovskii and A. M. Shur. *Zhurnal Prikladnoi Khimii*, v. 24, Oct. 1951, p. 1074-1077.

Describes procedures for separation of various fractions. Typical data are tabulated.

7977* Conditions of Bonding of Polymers. (In Russian.) A. Ia. Drinberg, Sh. N. Golant, and L. I. Goldfarb. *Zhurnal Prikladnoi Khimii*, v. 24, Oct. 1951, p. 1078-1083.

First of a series of papers on the transformation of saturated linear polymers into steric compounds.

Miscellaneous Publications

7978 Research of the Structure of Macromolecular and Colloidal Substances with the Aid of Small-Angle Dispersion. (In German.) Rolf Hosemann. *Ergebnisse der exacten Naturwissenschaften*, v. 24, 1951, p. 124-221, 443-444. (QC21 Er38)

Critical examination reveals that conflicting results obtained by earlier methods are largely resolved by the small-angle dispersion method. Design and use of a small-angle dispersion chamber is described and illustrated in detail; results are charted and tabulated. Includes diagrams and photographs. 188 ref.

Books

7979 Structural Adhesives; The Theory and Practice of Gluing With Synthetic Resins. 203 pages. 1951. Lange, Maxwell & Springer, Ltd., 41-45 Neal St., London W.C.2, England. (TP968 St89)

A series of lectures presented at a summer-school course given in Cambridge, England, by Aero Research, Ltd.

7980 Plastics Progress. Phillip Morgan, editor. 310 pages. 1951. Iliffe & Sons, Ltd., London. (TP986 P69)

Papers and discussions presented at the British Plastics Convention, June 6-15, 1951.

7981 Vinyl and Related Polymers. Calvin E. Schildknecht. 723 pages. 1952. John Wiley & Sons, New York. (TP986.V4 Sch33v)

Deals with their preparations, properties, and applications in rubbers, plastics, fibers, and medical and industrial arts. Emphasizes the practical chemistry and physics of polymerization and polymers, the basic inventions, the methods of synthesis, the advantages, and the limitations of the products. More than 4000 references from 1835 to the second half of 1951 are given.

7982 Extrusion of Plastics, Rubber and Metals. Herbert R. Simonds, Archie J. Weith, and William Schack. 454 pages. 1952. Reinhold Publishing Corp., New York. (TJ1450 Si56e)

Divided into 2 parts: the first covers extrusion as it applies to the broad plastics industry, and the second the extrusion of metals and other materials.

See also:
7428 (plastic apparatus for low-temperature work)
7592 (plastic tableware)
7616 (viscosity of highly viscous resins)
7791 (viscosity vs. molecular weight in polymer solution)
7863 (fibrous macromolecular systems)
7928 (plastics-mold production)
8238 (embedment resins for electronics components)

29. RUBBERS AND OTHER ELASTOMERS

7983* Mechanism of the Action of Inhibitors of Rubber Oxidation. (In Russian.) A. S. Kuz'minskii and L. G. Angert. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 11, 1952, p. 747-750.

Results of investigations of the above are discussed and charted.

7984* Role of Carbon Black in the Action of Light on Rubber. (In Russian.) Iu. S. Zuev. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 21, 1952, p. 935-938.

Experiments were made on the above. Data are discussed, tabulated, and charted.

7985 Ozone Deterioration of Elastomeric Materials; Preliminary Results of a Study by Infrared Spectroscopy. A. R. Allison and I. J. Stanley. *Analytical Chemistry*, v. 24, Apr. 1952, p. 630-635.

Explorative studies with ultimate objective of developing an accelerated ozone-aging test for elastomers based primarily on compositional changes rather than on the variation in physical characteristics. Infrared spectrographic techniques were found to be quite satisfactory. 12 ref.

7986 Nitrile Rubber Gaskets Make Better Seals. T. C. Aitchison and B. N. Bowers. *General Electric Review*, v. 55, May 1952, p. 46-50.

Properties, design information, and a reference album of illustrations of uses in electric assemblies.

7987 Elastomers. *Industrial and Engineering Chemistry*, v. 44, Apr. 1952, p. 695-861.

27 papers presented in part before the Division of Rubber Chemistry at the Diamond Jubilee Meeting of the American Chemical Society. 5 are on Dynamic Properties; 5 on Synthetic Rubber; 6 on Latex; 6 on Compounding; and 5 on Ozone Cracking.

7988 Viscosities of 0.25 to 90% GR-S Rubber Solutions. A. B. Bestul, H. V. Belcher, F. A. Quinn, Jr., and C. B. Bryant. *Journal of Physical Chemistry*, v. 56, Apr. 1952, p. 432-439.

Presents results of flow measurements with McKee worker-consistometer, and with Bingham viscometers at low concentrations, over entire concentration range for solutions of 2 GR-S rubbers in α-methylnaphthalene, as well as over a less complete concentration range for one of them in cetane. These measurements cover a range of rates of shear, and several different temperatures. Graphical data. 22 ref.

7989* Properties of Rubber Vulcanizates and Cords Subjected to Rapid Deformation. (Continued.) Primus Kainradl and Franz Handler. *Kautschuk und Gummi*, v. 5, Feb. 1952, p. WT22-WT27; Mar. 1952, p. WT38-WT42.

Describes temperature measurements made to evaluate the relationships between hysteresis and heat evaluation. Correlates results with those from previously used dynamic testing methods. Part 2 describes apparatus and methods of testing dynamic properties of cord and factors affecting those properties. Diagrams, photographs, and graphs. 27 ref.

7990* Primary Reactions in Rubber. (In German.) Ernst Koldehofe. *Kautschuk und Gummi*, v. 5, Mar. 1952, p. WT33-WT36.

A study was made of possible relationships between proteins and protease reactions of enzyme chemistry and the problems of rubber. Importance of oxygen and humidity in these complex reactions is discussed and an attempt is made to find a common basis for the 3-dimensional linkage reactions of nonsulfurous vulcanizing reagents and sulfur. Data are tabulated.

7991* X-Rays Used in the Production of Rubber Articles. (In Russian.) L. G. Borisova. *Legkaya Promyshlennost*, v. 11, Nov. 1951, p. 15-16.

Briefly discusses possibilities of the above.

7992* The Aging of Latex and Vulcanization. (In Russian.) A. S. Kuzminskii and N. N. Lezhnev. *Legkaya Promyshlennost*, v. 11, Nov. 1951, p. 25-28.

Influence of several factors on the above. Graphs.

7993 Cellular Rubber Insulates, Seals and Cushions. Philip O'Keefe. *Materials & Methods*, v. 35, Apr. 1952, p. 91-93.

Discusses latex foam, sponge and closed cellular rubbers which are available in sheet, strip, molded and special shapes, and provide a wide range of properties to fit a variety of applications.

7994 Properties of Some Heat-Resistant Adhesives. C. W. Roush and A. J. Kearfott. *Mechanical Engineering*, v. 74, May 1952, p. 369-374.

Information collected while developing and improving an adhesive for brake-shoe application, which is one of the most severe in the automotive industry. The requirements imposed indicate the range of properties that can be expected.

7995 Properties and Uses of Colloidal Carbon. C. W. Sweitzer, L. J. Venuto, and R. K. Estelow. *Paint, Oil, & Chemical Review*, v. 115, Apr. 10, 1952, p. 22-24, 26, 28, 30, 32, 55, 58-60, 62, 64.

Surveys the above for the rubber, paint, and other industries. Data are tabulated for the various grades. 33 ref.

7996* Preparation of Natural-Rubber, Carbon-Black Master Batches. (In French.) Patrice Compagnon and Maurice Liponski. *Revue Générale du Caoutchouc*, v. 29, Apr. 1952, p. 272-275.

Describes experiments in which simultaneous coagulation of latex and of a channel-black dispersion was carried out. Good results were obtained. Several advantages are indicated.

7997* Commercial Use of Peptized Rubber. (In French.) Guy Giger. *Revue Générale du Caoutchouc*, v. 29, Apr. 1952, p. 275-277.

Describes experiments in which peptizing agents were added to raw rubber at the production site. A considerable saving in energy required for mastication, and in rate of mastication, was obtained.

7998* Heat Sensitization of Latex by the Zinc Salt of Mercaptobenzimidazole. (In French.) Robert Delattre. *Revue Générale du Caoutchouc*, v. 29, Apr. 1952, p. 278-282.

Use of above salt is said to have practically none of the inconveniences of other methods. Experimental results are tabulated and discussed.

7999* Reinforcement of Rubbers. (In French.) R. Houwink. *Revue Générale du Caoutchouc*, v. 29, May 1952, p. 346-353.

Shows that the term "reinforcement" can only be properly applied to a particular mechanical property. On the basis of

29. *Rubbers and Other Elastomers*

thermodynamic analysis, difference between action of a reinforcing agent and a plasticizer is shown to be due to their relative internal strengths. A reinforcing agent must adhere to the polymer to a certain extent. Points out existence of a discrepancy of at least 1:10 between experimental and theoretical values of breaking stress. Theory of this discrepancy. Mechanisms for bond formation between chains are reviewed. Maximum reinforcing effect obtainable is discussed. Graphs, tables, and diagrams. 35 ref.

8000* Some Recent Developments in the Preparation of Foamed Latex. (In French.) Roger Hublin. *Revue Générale du Caoutchouc*, v. 29, May 1952, p. 354-357.

Reviews recent journal and patent literature. Two new methods which avoid washing the gel are given. Directions for use and composition of added ingredients are given. 10 ref.

8001 Studies on the Vulcanization and Structure of Polyacrylic Rubber. S. T. Semegen and J. H. Wakelin. *Rubber Age*, v. 71, Apr. 1952, p. 57-63.

Detailed discussion. Includes numerous X-ray diffraction patterns.

8002* The Action of Unsaturated Compounds on Natural Rubber in Solution. I. The Reaction Catalyzed by a Peroxide. André Delalande. *Rubber Chemistry and Technology*, v. 25, Jan.-Mar. 1952, p. 74-88. (Translated from *Revue Générale du Caoutchouc*, v. 26, June 1949, p. 426-432.)

Previously abstracted from original.

8003* Evaluation of the Vulcanization Characteristics of Crude Rubber. Pierre Thirion. *Rubber Chemistry and Technology*, v. 25, Jan.-Mar. 1952, p. 99-106. (Translated from *Revue Générale du Caoutchouc*, v. 28, Aug. 1951, p. 563-566.)

Previously abstracted from original.

8004* Contribution to the Physical Chemistry of Hevea Latex. I. Metal Cations in Latex. II. Adsorption of Metallic Cations on the Surface of Latex Particles. Robert Belmas. *Rubber Chemistry and Technology*, v. 25, Jan.-Mar. 1952, p. 124-132; 132-139. Translated from *Revue Générale du Caoutchouc*, v. 26, May 1949, p. 341-345.)

Previously abstracted from original.

8005* The Meaning of Terms Related to Curing. J. W. Schade. *India Rubber World*, v. 126, Apr. 1952, p. 67-72.

An attempt to standardize the above based on data obtained with the National Bureau of Standards strain tester and the mathematical relation discovered between time of cure and elongation of a test strip under specified load. Graphs.

Books

8006 The Fundamentals of Rubber Technology. 174 pages. 1947. Imperial Chemical Industries Ltd, Kynoch Press, Birmingham, England. (TS1890 Im7f)

A reproduction of 8 lectures presented to students of Newton Health Technical School, Manchester, as follows: "Student and Rubber Research"; "Principles of Latex Technology"; "Coloring of Rubber and Rubber-like Plastics"; "Designing of Technical Rubber Compounds"; "Fundamentals of Tire Technology"; "Fundamental Principles of Rubber Cable Technology"; and "Fundamentals of the Technology of the Rubber Proofing Industry".

See also:
7002 (polyisocyanates for bonding rubber to metal)
7979 (rubber bonding with synthetic resins)
8025 (neoprene-rubber coatings)

30. PAINTS, VARNISHES, LACQUERS, AND ENAMELS

8007 Blister Resistant House Paints. W. G. Vannoy. *American Paint Journal*, v. 36, Apr. 28, 1952, p. 82, 84-87.

Presents preliminary report on paints given severe tests by means of a test house, specifically designed and constructed for the purpose. Results appear significant. Tabular data on blister resistance, adhesion, and permeability are presented.

8008* Some Investigations of the Abrasion of Paint. N. A. Brunt. *Engineering*, v. 173, Apr. 18, 1952, p. 504-506.

Theoretical consideration of impact and friction abrasions and a study of several lacquers specially prepared for checking the suppositions. Tables and micrographs.

8009 Synthetic Resins for Industrial Finishes. Part I. William von Fischer. *Finish*, v. 9, May 1952, p. 27-29.

Review of industrial finishes, basic materials, their characteristics, and present stage of practical application development. (To be continued.)

8010* Clear Lacquers For Plated Parts. *Metal Finishing*, v. 50, May 1952, p. 57-59, 101.

Protection from corrosion or decay. Properties of paints and lacquers for Ag, brass, and Cu, with emphasis on Cr plate.

8011* Today's Opportunities for Nitrocellulose Lacquer. R. L. Huber. *Official Digest*, Jan. 1952, p. 19-28.

Describes the hot-spray process and presents a list of the cost-cutting advantages.

8012* A Physical and Chemical Basis for Mill Selection and Operation. O. F. Redd. *Official Digest*, Jan. 1952, p. 29-41.

With the large variety of pigments and vehicles which can be combined in an almost infinite number of combinations, it is not possible or practical to lay down fixed rules for grinding every formulation. There are however, a few basic principles which apply. Discusses these principles and shows how they influence the selection of grinding equipment and apply to the operation of ball and pebble mills, and to kneaders.

8013* Dielectric Properties of Organic Coatings. T. W. Dakin. *Official Digest*, Jan. 1952, p. 42-56.

A survey of the dielectric properties of 6 representative drying oil varnishes, one of which was pigmented. Correlations between the molecular structure and the dielectric properties are extensively discussed.

8014 Some Applications of Electronics in the Pigment and Related Industries. James T. Richmond and Peter E. Watson. *Journal of the Oil & Colour Chemists' Association*, v. 35, Apr. 1952, p. 162-174; disc. p. 175-177.

A brief introduction to the working of the basic electronic devices is given. Their applications in a wide variety of apparatus of interest to the paint and pigment industries, ranging from simple assemblies to an electronically controlled X-ray spectrometer for automatically determining the proportion of rutile to anatase in TiO_2, is surveyed.

8015 Control of Color of Organic Finishes. A. E. Kott. *Organic Finishing*, v. 13, Apr. 1952, p. 10-14.

A quantitative method for specifying and measuring the appearance of organic finishes. Description of the method explains the specific application for which it was adopted and indicates the possibility of its use in other color-control applications.

8016 Modern Pigments for Automotive Finishes. D. B. Killian. *Paint, Oil, & Chemical Review*, v. 115, Apr. 10, 1952, p. 14-16, 18.

Surveys the above.

8017 Improvements in Color Pigments. J. K. Donohue. *Paint, Oil, & Chemical Review*, v. 115, Apr. 10, 1952, p. 20-21.

Reviews the above.

8018* Amino Resins for Surface Coatings. Charles H. Parker. *Paint and Varnish Production*, v. 42, Apr. 1952, p. 19-23, 61.

Discusses the relationship of the chemistry of organic-solvent-soluble urea and melamine resins to their end uses.

8019* Development and Research in the Coating Materials Industry. Part V. Development Technic For Varnish Formulation. Howard C. Woodruff. *Paint and Varnish Production*, v. 42, Apr. 1952, p. 24-27.

Discusses some of the many commercial and technical considerations entering into vehicle formulation.

8020* Protective Coating Requirements by the Bureau of Yards and Docks. *Paint and Varnish Production*, v. 42, May 1952, p. 22-23.

Applies to construction and maintenance of shore installations including Navy bases, aircraft stations, and Marine bases. Includes color schedule and preparation of surfaces and painting of steel pilings.

8021 Synthetics Up to Date. H. I. Harvey. *Paint Technology*, v. 17, Mar. 1952, p. 123-126.

Brief notes on rubber hydrohalide dispersions, interpolyamides, emulsifying agents, dull lacquer finishes, alkyl aryl ketones, and polyamides.

8022 Modern Colour; A Review of Recent Discoveries and Improvements in Colours for Coatings. H. I. Harvey. *Paint Technology*, v. 17, Mar. 1952, p. 127-130.

Covers briefly the topics of drying phthalocyanine pigments, copper phthalocyanines, improved TiO_2, rutile TiO_2, disazo dyestuffs, pigmented transparent finishes, and polyazo dyestuffs.

8023 New Synthetic Resins and Derivatives. H. I. Harvey. *Paint Technology*, v. 17, Mar. 1952, p. 131-133, 135-138.

Brief items on stabilizing silicones, ether plasticizers, aminoformaldehyde condensates, polyesters, siloxane resins, C.N.S.L. resins, ketone condensates, stabilized polythenes, leather finishes, isopropenyldiphenyls and copolymers, para-substituted vinyls, and hydrocarbon-aldehyde resins.

8024* Hot Applied Coal Tar Coatings. N. T. Shideler. *Pipe Line News*, v. 24, Apr. 1952, p. 34-37.

Describes raw materials used, the coatings and their manufacture, and the coating process in mill and field, for pipeline pipes. Tabular data.

8025 Neoprene Solutions. A. Mitchell. *Rubber Age*, v. 71, Apr. 1952, p. 67-70.

Discusses research conducted to develop protective coatings from neoprene.

Books

8026 Paint and Varnish Production Manual. V. C. Bidlack and E. W. Fasig, editors. 288 pages. 1951. John Wiley & Sons, Inc., New York. (TP935 B47p)

Designed for the education of production personnel in the manufacture of surface coatings and for those interested in the problems of management. Covers physical facilities, paint and varnish plants, products, engineering, manufacturing operations, personnel, factory cost accounting, research, development and control, fire protection, safety and health.

See also:
6967 (Al in paints)
7995 (colloidal carbon in the paint industry)

31. AGRICULTURAL RESEARCH

8027* Data on Comparitive Tests of New Domestic Herbicides. (In Russian.) I. K. Tsitovich and Iu. S. Snitko. *Agriobiologiia*, Nov.-Dec. 1951, p. 129-132.

Discusses the results of tests of three herbicides designated 2,4-DU, 2M-4Kh, and DiNOK on weeds in wheat fields. Data on increased yields and effects on various plants are tabulated.

8028* Rate of Osmotic Intake of Solutions Into Plant Cells and Influence of the Shape of the Cells on Its Rate. (In Russian.) V. P. Nogtev. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 21, 1952, p. 1009-1012.

Experiments were made on the above. The data are discussed and are expressed by a mathematical formula.

8029* Influence of Copper on Water Conditions and Drought Resistance of Plants. (In Russian.) M. M. Okuntsov and O. P. Levtsova. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 1, 1952, p. 649-651.

Tests were made on the above by adding various amounts of $CuSO_4$ to the soil in which wheat was grown. Data are discussed and tabulated.

8030 Radioisotopes in Soil Fertilizer Research; a Review of Progress, 1948-1952. James M. Blume. *American Plant Food Journal*, v. 6, Jan.-Feb.-Mar. 1952, p. 2-5, 13.

8031* Agricultural Frit: A Synthetic Mineral for Agriculture, Containing Trace Elements. Charles A. Vana. *Analysts Journal*, v. 8, Mar. 1952, p. 85-88.

Brief account of development and uses of above, especially for the product of Ferro Corp.

8032* Information Concerning the Phosphates. VII. (In German.) S. Gericke. *Angewandte Chemie*, v. 64, Mar. 21, 1952, p. 164-165.

Shows that introduction of fluorine into finished Thomas phosphate up 4% does not decrease solubility and the fertilizing action of the phosphoric acid. Fluorapatite is not formed. On the other hand, addition of fluorine considerably impairs solubility and the fertilizing effect of phosphoric acid in dicalcium phosphate as a result of the formation of fluorapatite.

8033* The Influence of Mineral Nutrition on the Viscosity of Solutions and the Saccharification of Potato Starch. (In Russian.) G. M. Tuliakova. *Biokhimiia*, v. 16, Nov.-Dec. 1951, p. 584-591.

A detailed study. Tables and graphs. 12 ref.

8034* Studies on the Relation Between Molecular Structure and Physiological Activity of Plant Growth-Regulators. I. Abscission-Inducing Activity. Robert L. Weintraub, James W. Brown, Jean C. Nickerson, and Katharine N. Taylor. *Botanical Gazette*, v. 113, Mar. 1952, p. 348-362.

16 references.

8035 The Decomposition of Dithicarbamate Fungicides, With Special Reference to the Volatile Products. L. E. Lopatecki and W. Newton. *Canadian Journal of Botany*, v. 30, Mar. 1952, p. 131-138.

8036 Systox Story. *Chemical Week*, v. 70, May 17, 1952, p. 50-51, 52.

News story announcing U. S. Dept. of Agriculture's first permission to use the systemic insecticide, Systox, made by Pittsburgh Agricultural Chemical Co.

8037 Problems Arising From the Use of Chemicals in Food. Agricultural Spray Residues. J. T. Martin. *Chemistry & Industry*, Apr. 19, 1952, p. 345-349; disc., p. 349-350.

8038* Remarkable Chemical Plasticity of the Grapevine Leaf With Respect to Manganese. (In French.) Louis Maume and Jacques Dulac. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 10, 1952, p. 1201-1203.

A study of variations of proportion of Mn as a function of age of the leaf and vine, of method of exploitation, and of environment.

8039* Mixed Fertilizers. K. G. Clark and W. M. Hoffman. *Farm Chemicals*, v. 115, May 1952, p. 17-19, 21, 23.

Data on chemical content of plant nutrients given in 1949-1950 survey of above. Gives information on different forms of phosphorus.

8040* The Fibrillate Structure of Natural Cellulose. Charles W. Hock. *Journal of Polymer Science*, v. 8, Apr. 1952, p. 425-434.

49 references.

8041* Research on the Insecticidal Effect of Organic Compounds. Report IV. The Effect of Bi- and Tri-Nuclear Condensed Aromatic Compounds. (In German.) Ferdinand Beran, Vinzenz Prey, and Helene Böhm. *Mittellungen des Chemischen Forschungsinstitutes der Wirtschaft Österreichs*, v. 6, Feb. 1952, p. 12-13.

Includes table of compounds with physical properties, insecticidal effects, and effect on human respiratory organs.

8042* Studies on Systemic Fungicides. II. Behavior of Groups of Reported Chemotherapeutants. S. H. Crowdy and Mary-Elizabeth Davies. *Phytopathology*, v. 42, Mar. 1952, p. 127-131.

Several groups of compounds reported as chemotherapeutants

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were tested for their ability to reduce the intensity of chocolate-spot disease of broad bean. 10 ref.

8043* Effect of Spraying With Zineb on the Growth and Zinc Content of the Tomato Plant. R. G. Emge and M. B. Linn. *Phytopathology*, v. 42, Mar. 1952, p. 133-136.

Zn analyses were run on stems and fruit of tomato plants sprayed in the field with several Zn fungicides. The highest concentrations of this element in stems were found, in general, in plants receiving zineb (zinc ethylene bisdithiocarbamate. The results of fruit analyses were inconclusive. Comparative Zn concentrations and growth rates were determined for young tomato plants grown in a Zn-deficient and a complete Hoagland's solution and sprayed once with suspension of technical-grade zineb and a solution of $ZnSO_4$.

8044* Molybdenum Requirement of Leguminous Plants Supplied With Fixed Nitrogen. W. R. Meagher, C. M. Johnson, and P. R. Stout. *Plant Physiology*, v. 27, Apr. 1952, p. 223-230.

A study of the above for the garden pea and dwarf horticultural bean which are shown to require Mo for completion of life cycle. Discusses also quantitative requirements, specific deficiency symptoms, and nature of recovery of injured plants. Photographs.

8045* Surface Activity as Related to Physiological Activity of Plant Growth-Regulators. Leslie G. Paleg and Robert M. Muir. *Plant Physiology*, v. 27, Apr. 1952, p. 285-292.

Suppressive effect of plant growth-regulators upon polarographic oxygen maximum was used as a measure of the activity of these substances at a phase boundary. Effect was determined for 25 compounds. No correlation was found with physiological activity. It is concluded that chemical reactivity is more important than adsorbability for the manifestation of growth-regulating properties by organic compounds. Tables and polarograms. 12 ref.

8046* Metabolism of 2,4-Dichlorophenoxyacetic Acid. I. $C^{14}O_2$ Production by Bean Plants Treated With Labeled 2,4-Dichlorophenoxyacetic Acids. Robert L. Weintraub, James W. Brown, Melvin Fields, and John Rohan. *Plant Physiology*, v. 27, Apr. 1952, p. 293-301.

Radioactive CO_2 is produced by plants which have been treated with 2,4-dichlorophenoxyacetic acids containing C^{14} in either the carboxyl or the methylene positions. The evolution of $C^{14}O_2$ continues at a relatively low rate during a period of several days. The initial rate of production from carboxyl-labeled 2,4-D is several times that from methylene-labeled 2,4-D. No CO_2 is evolved from the ring C at position 1. Tables and diagrams.

8047* Varietal Root and Top Regeneration of Fig Cuttings As Influenced by the Application of Indolebutyric Acid. Julian C. Crane and Tara S. Mallah. *Plant Physiology*, v. 27, Apr. 1952, p. 309-319.

10 references.

8048* Measurement of Metabolic Gas Exchange With a Recording Mass Spectrometer. Allan H. Brown, Alfred O. C. Nier, and Richard W. Van Norman. *Plant Physiology*, v. 27, Apr. 1952, p. 320-334.

Describes a new method for measuring gaseous metabolism of cells, tissues, and whole organisms. Method offers unique advantages for physiological studies. In principle, measurements consist of successive analyses, at frequent intervals, of partial pressures of several constituents of the gas phase over the biological material under observation. A mass spectrometer is employed. Circuit and apparatus diagrams. 13 ref.

8049* The Role of Ortho-Substitution in the Synthetic Auxins. Kenneth V. Thimann. *Plant Physiology*, v. 27, Apr. 1952, p. 392-404.

A study of the above involving activity of several tri-substituted phenoxyacetic acids and some other compounds in the pea test. Summarizes and evaluates published views and proposes a detailed theory to account for effects of specific molecular structural substitutions. 19 ref.

8050* Further Studies in the Simplification of Equipment for Subirrigation Experiments in Plant Nutrition. George R. Johnstone. *Plant Physiology*, v. 27, Apr. 1952, p. 405-407.

8051* The Biosynthesis of Carbon-14-Labeled Compounds. II. The Chromatographic Separation of the Monosaccharides, Disaccharides, and Trisaccharides From Plant Extracts. G. R. Noggle and M. Eleanor Schumacher. *Plant Physiology*, v. 27, Apr. 1952, p. 422-426.

8052* Process of Humus Formation in Certain Primitive Mineral Soils. (In Russian.) I. V. Aleksandrova. *Pochvovedenie*, Oct. 1951, p. 604-616.

Tables and 33 ref.

8053* The Problem of Methods of Soil Research in Large-Scale Kolkhoz Fields. (In Russian.) B. F. Petrov. *Pochvovedenie*, Nov. 1951, p. 696-709.

Discusses soil sampling and testing and use of soil maps. Illustrated.

8054 Industrial Needs For Raw Materials of Plant Origin. H. H. Sineath and Phillip M. Daugherty. *Research Engineer* (Georgia Institute of Technology), Mar. 1952, p. 5-6, 21-24.

Discusses Federally-supported work at Georgia Tech for information on scarce foreign crops of chemurgic importance that can be grown in the United States.

8055* Copper in the Nutrition of *Hevea Brasiliensis*. (In French.) Pierre Tixier. *Revue Générale du Caoutchouc*, v. 29, May 1952, p. 358.

Results of experiments made in Indochina in two markedly different soils which occur there are outlined. Tabular data indicate the value of fertilization with small quantities of $CuSO_4$.

8056* CSMA Aerosal Test Method. *Soap and Sanitary Chemicals*, 1952 Blue Book and Catalog Edition, p. 251-253, 275.

Presents the official specification and standard aerosal test method for flying insects of The Chemical Specialties Manufacturers Association.

8057* The Peet-Grady Method. *Soap and Sanitary Chemicals*, 1952 Blue Book and Catalog Edition, p. 255-258.

Presents the official method of the Chemical Specialties Manufacturers Association for evaluating liquid household insecticides, (1952 revision.)

8058* A Concept Concerning the Measurement of Available Soil Nutrients. Maurice Fried and L. A. Dean. *Soil Science*, v. 73, Apr. 1952, p. 263-271.

The concept presented provides a basis by which a given nutrient in a soil is compared to that of a standard containing this nutrient. It is assumed that the definition of "available nutrient in the soil" implies that when 2 sources of a given nutrient are present in the soil, the plant will absorb from each of these sources in proportion to the respective quantities available.

8059* Use of Ca45 Labeled Calcium Carbonate in Determing Proportions of Native and Additive Calcium in Lysimeter Leachings and in Plant Uptake. Henry C. Harris, W. H. MacIntire, C. L. Comar, W. M. Shaw, S. H. Winterberg, and S. L. Hood. *Soil Science*, v. 73, Apr. 1952, p. 289-298.

Presents comparative findings from simultaneously conducted lysimeter and greenhouse experiments in which Ca^{45} was included in the incorporations of precipitated $CaCO_3$. 11 ref.

8060* Radiation Effects on Plants Grown in Soil Treated With Fertilizer Containing P32. James M. Blume. *Soil Science*, v. 73, Apr. 1952, p. 299-303.

Work reported deals with 2 experiments in which cereals grown in the greenhouses were fertilized with KH_2PO_4 solutions of several P^{32}-P^{31} ratios. In each experiment, the soil was fertilized in bulk with 75 lbs. N and 150 lbs. K_2O per acre, the sources being NH_4NO_3 and KCl.

8061* Uptake and Movement of Fertilizer Phosphorus. J. Jordan, C. Simkins, G. Corey, R. Knight, and G. O. Baker. *Soil Science*, v. 73, Apr. 1952, p. 305-313.

Objectives in this experiment were to determine the effect of moisture tension upon P uptake by potatoes from banded and

broadcast superphosphate at various stages of growth; to measure the proportion and total uptake of P supplied by the fertilizer and by the soil; and to study fertilizer P movement in the soil as influenced by irrigation. 12 ref.

8062* Research in Fruit-Growing; The Importance of Scientific Investigation. H. B. S. Montgomery. *Times Review of the Progress of Science*, Autumn 1951, p. 5-6.

Brief illustrated review of above. Considers propagation of rootstocks, soil management, trace elements, virus diseases, and red spider mite.

8063* Slate Ashes as a Material for Liming Soil. (In Russian.) I. S. Veshenskaia. *Doklady Vsesyuznoi Ordena Lenina Akademii Sel'skokhozyaistvennykh Nauk imeni V. I. Lenina*, v. 16, no. 10, 1951, p. 43-48.

Steel-mill slags were found to be one of the best materials for liming soil. They have detrimental effect on crops such as flax and potatoes which are sensitive to excess lime. Tables.

8064* Apparatus for Determining the Water Permeability of Soils (Earths) Under Field Conditions. (In Russian.) V. M. Klychinikov. *Doklady Vsesoiuznoi Ordena Lenina Akademii Sel'skokhozyaistvennykh Nauk imeni V. I. Lenina*, no. 11, 1951, p. 33-40.

Described, diagrammed and illustrated. Test data tabulated.

Miscellaneous Publications

8065 Tobacco Research: Annual Report for 1950-51. Cawthron Institute of Scientific Research and Tobacco Research Station (New Zealand), 3 pages. (S17 C31at)

Summarizes work on several aspects of the above.

Books

8066 Principles of Plant Physiology. James Bonner and Arthur W. Galston. 499 pages. 1952. W. H. Freeman and Co., San Francisco. (QK711 B64p)

An elementary text. Questions and supplementary-reading references follow each chapter.

8067 Potash: Its Production and Place in Crop Nutrition. G. A. Cowie. 172 pages. 1951. Edward Arnold & Co., London. (TN919 C83p)

History, commercially developed deposits, extractive and manufacturing processes, potential and byproduct sources, production and consumption of potassic fertilizers, relation of K to soils and crops, diagnosis of mineral deficiencies and requirements of various crops (emphasis on British types.) Photographs, tables, and chapter bibliographies.

8068 Animal Nutrition. Ed. 3. Leonard A. Maynard. 1951. 474 pages. McGraw-Hill, New York. (QP141 M45an3)

Replaces 1947 edition. While application to farm animals is emphasized, consideration is also given to broader relationships and significance of the basic principles. Chemical and physiochemical aspects are treated in the earlier chapters. The revision reflects especially advances with respect to amino acids, vitamins, and micromineral elements. Some expansion of the biochemistry of nutrition has been made. Footnote references and chapter bibliographies.

8069 Mineralnoe Pitanie Rastenii i Poglotitelnaia Sposobnost Pochy. (Mineral Nutrition of Plants and the Absorptive Power of Soils.) E. I. Ratner. 319 pages. 1950. Academy of Sciences of the USSR, Moscow and Leningrad. (QK867 R18m)

Concerned mainly with adsorption binding of certain substances in soils and the availability of such substances to plants. Special attention is paid to the behavior of Ca, K, P, and Na. Solonetz soils in the U. S. S. R. are studied in relation to the possibility of their fertilization.

8070 Trace Elements in Plants & Animals. Walter Stiles. 189 pages. 1951. Cambridge University Press, London. (QK867 S53t2)

Surveys, selects, and summarizes past work, indicates the present state of knowledge of trace elements, and some of the lines along which inquiries may be pursued.

8071 The Action of Hormones in Plants and Invertebrates. Kenneth V. Thimann, editor. 228 pages. 1952. Academic Press, Inc., New York. (QP801.H7 T34a)

Reprinted, with additions and supplementary bibliographies, from "The Hormones", Vol. I.

8072 A Survey of Soviet Russian Agriculture. Lazar Volin. 193 pages. Aug. 1951. U. S. Dept. of Agriculture, Washington. (Agriculture Monograph 5.) (HC331 V88s)

Presents results of a comprehensive study of the above. Includes maps, tables, graphs, and footnote references to Soviet periodicals. Limitations of Soviet statistics are discussed in the introduction.

See also:

7306 (determination of insecticide on food crops)
7307 (microstructure of S in plants)
7326 (analysis of organic insecticides)
7433 (specifications for insecticides)
7641 (structure of clay minerals)
7700 (problems in use of organic chemicals for insecticides)
7711 (fertilizer from refinery waste)
7725 (enzymic degradation of cellulose)
8327 (inorganic fertilizers in agriculture)
8351 (plant physiology)

32. PHYSICS

8073 Rotational Dispersion in the Velocity, Attenuation, and Reflection of Ultrasonic Waves in Hydrogen and Deuterium. Ellen S. Stewart and James L. Stewart. *Journal of the Acoustical Society of America*, v. 24, Mar. 1952, p. 194-198.

15 references.

8074 Experimental Investigations on the Origin of the Anomalous Absorption of Ultrasonic Waves in Liquids. Yasaku Wada and Sotoshi Shimbo. *Journal of the Acoustical Society of America*, v. 24, Mar. 1952, p. 199-202.

13 references.

8075 Transmission of Ultrasonic Waves Through a Thin Solid Plate at the Critical Angle for the Dilatational Wave. K. Rachel Makinson. *Journal of the Acoustical Society of America*, v. 24, Mar. 1952, p. 202-206.

Above is examined experimentally and theoretically. It is shown to be possible to use the total reflection method for determination of dilatational velocity in a solid even when only thin specimens of the solid are available. 12 ref.

8076 New Methods of Ultrasonoscopy and Ultrasonography. Paul J. Ernst and Charles W. Hoffman. *Journal of the Acoustical Society of America*, v. 24, Mar. 1952, p. 207-211.

Four groups of new methods of indirect ultrasonoscopy and ultrasonography are developed: those using temperature-sensitive chromotropic compounds, those using leucobases of dyes, those using thermo-stimulable phosphors, and those using special temperature-sensitive phosphors. Various techniques are described and some results are shown in the illustrations. Finally, a new method of direct ultrasonography is proposed. This method makes use of the possibility of detonation of certain labile chemical compounds by ultrasonics. 22 ref.

8077 Radiation Loading of a Piston Source in a Finite Circular Baffle. Robert B. Watson. *Journal of the Acoustical Society of America*, v. 24, Mar. 1952, p. 225-228.

Design of an ultrasonic transducer requires knowledge of the mechanical and electrical constants of the driving mechanism, the nature of the coupling between the motor and load, and the value of the radiation load. The present work is devoted to a study of the variation of radiation load by means of plane circular baffles.

8078* Theories of Helium. II. R. B. Dingle. *Advances in Physics*, v. 1, Apr. 1952, p. 111-168.

A comprehensive review of theories proposed to explain peculiar properties of liquid He. 225 ref.

8079* A Synopsis of the Technical Sessions at the 20th Annual Meeting. *Aeronautical Engineering Review*, v. 11, Apr. 1952, p. 24-45.

Brief surveys of papers presented at the above meeting cover-

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ing aerodynamics, aeroelasticity, structure, design, electronics, and rocket and flight propulsion.

8080* Supersonic Flow Over Thin Symmetrical Wings With Given Surface Pressure Distribution. F. A. Goldsworthy. *Aeronautical Quarterly*, v. 3, Feb. 1952, p. 263-279.

The inverse problem of determining the supersonic flow past a thin symmetrical wing at zero incidence with given surface-pressure distribution is solved for wings of arbitrary plan form. The results are applied to specific problems.

8081* A Note on Supersonic Wing Integral Equations in Unsteady Flow. John W. Miles. *Aeronautical Quarterly*, v. 3, Feb. 1952, p. 294-296.

Integral equations for pressure distribution on an oscillating thin wing having a prescribed velocity distribution in a supersonic flow are developed.

8082* The Theory of Single-Domain Particles. (In Russian.) E. Kondorskii. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 21, 1952, p. 365-368.

A theoretical discussion is given of single-domain, ferromagnetic particles.

8083* Relationship Between Breakdown Resistance and Mobility of Charges in Dielectrics. (In Russian.) E. K. Zavadovskaia. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 1, 1952, p. 565-566.

A theoretical, mathematical analysis.

8084* Dependence of the Electroconductivity of Quartz on Electrical Field, Temperature, and Magnetic Field. (In Russian.) P. E. Sarzhevskii. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 1, 1952, p. 571-574.

Natural quartz was used for investigation of the above. Data are discussed and charted. 10 ref.

8085* Photoluminescence of the Sublimate Phosphor of Silver Iodide. (In Russian.) K. V. Shalimova and N. S. Mandakov. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 1, 1952, p. 575-578.

Includes spectrograms showing the above.

8086* Flow on a Heated Solid Body in a Standing Acoustic Wave. (In Russian.) P. N. Kubanskii. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 1, 1952, p. 585-588.

Describes method of investigation and results obtained. The latter are photographically illustrated.

8087* The Extent of Emission of Secondary Electrons. (In Russian.) M. M. Vidynskii. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 11, 1952, p. 705-708.

Apparatus for determining the above is described. It was found that the coefficient of secondary electron emission decreased with decrease in thickness of a Ag film on Al. Experimental results are discussed.

8088* Dielectrics with High Electrical Strength. (In Russian.) E. K. Zavadovskaia. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 11, 1952, p. 709-712.

The lattice energies of 61 binary salts (experimental data) are compared with calculated and experimental values of dielectric strength. Data are discussed and tabulated.

8089* Duration of the Excited State of Certain Phosphors. (In Russian.) K. V. Shalimova and T. P. Belikova. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 11, 1952, p. 713-716.

The duration of luminescence of several phosphors was measured. Results are discussed and tabulated. 11 ref.

8090* Generalization of an Approximate Law to Solution of "Even" Effects. (In Russian.) G. P. Diakov. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 21, 1952, p. 867-868.

Discusses an approximate method of solving problems connected with magnetostrictive, electromagnetic, and similar effects.

8091* Influence of Variable Compression Loads on the Magnetic Properties of Magnetite. (In Russian.) D. L. Finger. *Izvestiia Akademii Nauk SSSR*, Geophysical Series, Sept.-Oct. 1951, p. 51-67.

An experimental study was made of the magnetostrictive properties of magnetite. It was established that variable tensions and compressions causes an increase of the magnetization of ferromagnetic materials, independent of the sign of magnetostriction. Data are tabulated and charted. 16 ref.

8092* Experimental Determination of Local and Average Coefficients of Heat Emission During Turbulent Flow in Tubes. (In Russian.) I. T. Alad'ev. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences. Nov. 1951, p. 1669-1681.

Formulas for the above are derived from experimental data. Data are tabulated and charted. 10 ref.

8093* Method for Investigation of Vibration Cavitation in Liquids Using Ultrasonic Waves. (In German.) Th. Lange. *Akustiche Beihefte*, no. 2, 1952, p. AB75-AB82.

Describes apparatus and procedure. Typical results are charted and illustrated by means of oscillograph traces. 10 ref.

8094* Some Measurements on Barium Titanate. (In German.) H. Schmidt. *Akustiche Biehefte*, no. 2, 1952, p. AB83-AB88.

For circular piezoelectric discs, formulas are given from which it is possible to calculate the mechanical constants of the disc material from electrical measurements. Dependence of temperature upon dielectric constant, electrical loss factor, elastic modulus, mechanical loss angle, on the piezo-modulus of $BaTiO_3$ and the mixed ceramic $BaTiO_3$-$PbTiO_3$ was measured. Mechanical and electrical constants are tabulated. 12 ref.

8095* Critical Observations on Linear Magnetostrictive Ultrasonic Wave Production by Means of Dumbbell-Type Oscillators. (In German.) H. H. Rust and E. Bailitis. *Akustiche Beihefte*, no. 2, 1952, p. AB89-AB90.

8096* Clarification of a Number of Chemical Effects of Ultrasonic Waves. (In German.) Hans Heinrich Rust. *Angewandte Chemie*, v. 64, Mar. 21, 1952, p. 162-163.

Shows that formation of O_2 in liquids containing water and cleavage of the molecular linkage in CCl_4 dissolved in water caused by ultrasonic waves is tied up with the presence of very small bubbles of gas oscillating in resonance. The ultrasonic chemical effects mentioned do not occur in degassed liquids or when standing waves are prevented. 13 ref.

8097* Electrical and Optical Behavior of the Copper Sulfides. (In German.) L. Eisenmann. *Annalen der Physik*, ser. 6, v. 10, no. 3, 1952, p. 129-152.

Experiments with different Cu sulfides, including fractional-valence compounds such as $Cu_{1.8}S$. Semiconducting properties are covered. Diagrams and graphs. 44 ref.

8098* An Optical Method of Determining the Complex Dielectric Constant ϵ and the Magnetic Permeability μ. (In German. H. Falkenhagen and G. Kelbg. *Annalen der Physik*, ser. 6, v. 10, no. 3, 1952, p. 170-176.

Describes mathematics of above method.

8099* Dirac's New Classical Electron Theory. (In German.) G. Höhler. *Annalen der Physik*, ser. 6, v. 10, no. 3, 1952, p. 196-200.

8100* Determination of Ion Paths in Crossed Electric and Magnetic Field. M. E. Reinders, C. J. Zilverschoon, and J. Kistemaker. *Applied Scientific Research*, v. 2, sec. B, no. 4, 1952, p. 264-268.

Ion paths in crossed electric and magnetic fields were calculated, using a step-by-step method. Two examples are given: the ions in a Nier-source and the ions passing the acceleration electrode of an electromagnetic isotope separator.

8101* Subharmonic Oscillations in Electric Circuits Containing Iron-Core Reactors. J. P. Schouten and H. J. Heijn. *Applied Scientific Research*, v. 2, sec. B, no. 4, 1952, p. 301-319.

An investigation was made of subharmonic oscillations, generated in an electric circuit, consisting of an iron-core reactor, a resistor and a condensor connected in series, fed by a sinusoidal E.M.F. The flux vs. current curve is approximated by 3 parts of straight lines, each of different slope. After discus-

sing the solution of a differential equation graphically, a calculation is made, confirming the experimental results.

8102* Non-Iterative Numerical Solution of Boundary-Vlaue Problems. Morton A. Hyman. *Applied Scientific Research*, v. 2, sec. B, 1952, p. 325-351.

A method is presented for the above, applicable to arbitrary regions in any number of dimensions. The technique of solution is non-iterative and appears well-adapted to use with high-speed computing machines. 15 ref.

8103* Magnetic Analysers For Nuclear Disintegration Studies. Joan M. Freeman. *Atomics* (London), v. 3, May 1952, p. 117-125, 131.

Measurement of charged particle groups emitted in nuclear reactions. Reviews the importance of, and describes the various types of magnetic analyzers that have been developed for this purpose.

8104 Industrial Use of Sound. Boyd A. Wise, Jr. *Battelle Technical Review*, v. 1, Apr. 1952, p. 40-41.

Surveys the above; discusses present and potential applications, with emphasis on high-frequency sound waves or ultrasonics. Methods of generation of these waves and their use in non-destructive testing.

8105 Liquid Films Formed by Means of Rotating Disks. B. E. Dixon, A. A. W. Russell, and J. E. L. Swallow. *British Journal of Applied Physics*, v. 3, Apr. 1952, p. 115-119.

A study was made of liquid films ejected from the rims of rotating disks with liquid supplied at the center. A distinction is made between films tending to ellipsoidal shape whose peripheral thicknesses vary within fairly wide limits, and substantially horizontal films whose dimensions are governed by the "breaking thickness" of the liquid concerned. The mechanism of formation and destruction of these liquid films is discussed and differences in the behavior of water and glycol examined. Illustrations and graphs.

8106 The Elastic Constants of Piezoelectric Crystals. R. F. S. Hearmon. *British Journal of Applied Physics*, v. 3, Apr. 1952, p. 120-124.

The values available in the literature for the elastic constants of the piezoelectric crystals Rochelle salt, potassium dihydrogen phosphate, ammonium dihydrogen phosphate, quartz, sodium chlorate, and sodium bromate are assembled. The averages and standard deviations of the estimates are calculated, and variability of the results discussed. For comparison with results on piezoelectric crystals, the available determinations on non-piezoelectric crystals NaCl, LiF, and pyrites are also summarized. It is concluded that elastic constants of crystals are seldom known to better than 1% and in many cases the uncertainty is considerably larger. 23 ref.

8107 Pool Surface and Cathode Spot Temperature of Mercury Cathodes as a Problem in Heat Conduction. H. V. Bertele. *British Journal of Applied Physics*, v. 3, Apr. 1952, p. 127-132.

17 references.

8108 The Acoustical Field Near A Circular Transducer. E. W. Guptill and A. D. MacDonald. *Canadian Journal of Physics*, v. 30, Mar. 1952, p. 119-122.

An approximate solution for the near field of a circular transducer is given.

8109* Energy Radiated in Different Wave-Length Regions by Condensed Discharges in Krypton. Comparison With Results Obtained With Xenon. (In French.) Roger Legros. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 3, 1952, p. 1047-1048.

8110* A New Apparatus for Measuring the Intensity of a Magnetic Field. (In French.) Raymond Birebent. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 10, 1952, p. 1135-1136.

Briefly discusses an apparatus, with reduced transverse dimensions, which makes it possible to study the distribution of a magnetic field and to measure its intensity. The measured intensities cover a very wide interval. Includes graph.

8111* Gaseous Jets Sensitive to Infrasounds. (In French.) Maurice Dubois. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 17, 1952, p. 1259-1260.

Discusses the above with respect to jets 3.23 to 3.88 mm. diam., with a 30 to 50 cm. per sec. flow rate, to which a vibration frequency of 5 to 10 per sec. is applied.

8112* Magnetostriction of Various Heat-Oriented Ferrites. (In French.) Louis Weil. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 24, 1952, p. 1351-1352.

Outlines investigation of the influence of thermal orientation on magnetostriction in pure Co ferrite and in solutions of various proportions of this ferrite in the ferrites of Mg and Ni. Includes graphs.

8113* "Fine Structures" of Mineral-Oil Color Curves on the Basis of Investigations in the Pulfrich Photometer With Spectral Light Decomposition (Monochromator). (In German.) Rudolf Koetschau. *Erdöl und Kohle*, v. 5, Jan.-Feb. 1952, p. 83-90.

Object of research was to express the above accurately in mathematical terms. Tables and graphs.

8114 Luminescence and Adsorption Phenomena in Some Oxides and Halides. J. Ewles and C. N. Heap. *Transactions of the Faraday Society*, v. 48, Apr. 1952, p. 331-338.

Improved arrangements are set up for heating the solid, redistilling the wetting liquid, and bringing the 2 into contact in vacuum and sealing-off for spectroscopic and other examination without exposure at any time to air.

8115* Heat-Transfer Coefficient in Hydrodynamically and Thermally Laminar Flow in Tubes. (In German.) H. W. Hahnemann. *Forschung auf dem Gebiete des Ingenieurwesens*, ser. B, v. 18, Jan. 1952, p. 25-26.

Brief mathematical study includes a graph in which Nusselt's number is plotted as a function of Peclet's number.

8116 Moisture Migration in a Closed Guarded Hot Plate. N. B. Hutcheon and J. A. Paxton. *Heating, Piping, & Air Conditioning*, v. 24, Apr. 1952, p. 113-122.

Evidence is provided in support of a method of predicting moisture distribution in hygroscopic materials at low moisture contents. Heat flow and moisture flow are shown to be interrelated, with a substantial proportion of the heat being transmitted as latent heat during the initial stages of moisture migration. 12 ref.

8117 A Graphical Analysis For Non-Linear Systems. Pei-Su Hsia. *Proceedings of the Institution of Electrical Engineers*, v. 99, pt. 2, Apr. 1952, p. 125-131; disc., p. 132-134.

A graphical analysis is developed for solution of 2nd-order differential equations for systems with non-linear damping and restoring forces and with arbitrary drives. Construction of the general type of differential equation is shown, errors are discussed, some practical problems are evaluated, and results are compared with experimental solutions or those from other methods.

8118 Interferometric Analysis of Airflow About Projectiles in Free Flight. F. D. Bennett, W. C. Carter, and V. E. Bergdolt. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 453-469.

Describes adaptation to the ENIAC of the interferogram reduction problem for axisymmetric flows. Isopycnal charts and interferograms are presented, and comparison is made with similar studies by other workers using fixed models in a wind tunnel or a circular jet. Tables. 24 ref.

8119 Oxygen-Free Single Crystals of Lead Telluride, Selenide, and Sulfide. W. D. Lawson. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 495-496.

Describes a method for growing the above by melting the elements into the crucible in an atmosphere of hydrogen.

8120* The Compressible Boundary Layer. George B. W. Young and Earl Janssen. *Journal of the Aeronautical Sciences*, v. 19, Apr. 1952, p. 229-236, 288.

The laminar boundary-layer equations in integral form as ob-

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tained by Moore are solved on the mechanical differential analyzer. The method of analysis permits the use of the best known variation of the air properties with temperature. Solutions are obtained for Mach Numbers ranging from incompressible speeds to the hypersonic regime at ambient temperatures of 100°, 400°, and 800°R. for both insulated-plate and heat-transfer cases. From these results, an approximate design procedure for the calculation of the characteristics of both the laminar and turbulent boundary layers is obtained and presented as an aid to missile designers.

8121* Experiments on Interaction of Shock Waves and Cylindrical Bodies at Supersonic Speeds. M. V. Morkovin, E. Migotsky, H. E. Bailey, and R. E. Phinney. *Journal of the Aeronautical Sciences*, v. 19, Apr. 1952, p. 237-248.

Presents the highlights of an experimental investigation of a 3-dimensional shock-cylinder configuration conducted in the University of Michigan Supersonic Wind Tunnel at a Mach Number of 1.90. Graphs and illustration. 21 ref.

8122* Shock-Tube Studies of Transonic Flow Over Wedge Profiles. Wayland Griffith. *Journal of the Aeronautical Sciences*, v. 19, Apr. 1952, p. 249-257, 264.

Steady flow fields around 2-dimensional wedges were studied for Mach Numbers between 0.85 and 1.80 using the shock tube. The position of the sonic line and the pressure distribution over the wedge have been calculated from the density fields measured with a Mach-Zehnder interferometer. Experimental data on the drag of a thin wedge through the entire transonic range are available for the first time and are in excellent agreement with recent theoretical calculations based on transonic small-disturbance theory. 23 ref.

8123* Heat Transfer on the Surface of a Flat Plate in the Forced Flow. (In English.) Sugao Sugawara, and Takashi Sato. *Memoirs of the Faculty of Engineering* (Kyoto University), v. 14, Jan. 1952, p. 21-37.

A study of the effects of some factors on the above. Considers smooth and rough plates. Determined that in a range of larger numbers than a certain Reynolds' number, there is formed a special turblent boundary layer which is influenced by surface roughness, and in this range, the local heat transfer coefficient is independent of position, and its value becomes largest when the ratio of height to pitch of the surface roughness is 0.055. Graphs.

8124 Measurement of Cesium-137 and Cobalt-60 Gamma Radiation With a Pressure Ionization Chamber. G. R. Grove. *Journal of Research of the National Bureau of Standards*, v. 48, Feb. 1952, p. 147-151.

The characteristics of the pressure ionization chamber at the National Bureau of Standards were studied for the gamma radiation from a Cs-137 source (0.6614 Mev.) and from a Co-60 source (1.1715 and 1.3316 Mev.). The dosage rates produced in air by these sources were measured with this chamber with an accuracy of about 2%.

8125* On the Anomalous Transparency of Thick Crystals to X-Rays. W. H. Zachariasen. *Proceedings of the National Academy of Sciences*, v. 38, Apr. 1952, p. 378-382.

8126 X-Ray Line-Broadening From Cold-Worked Iron. J. H. Auld and R. I. Garrod. *Nature*, v. 169, Apr. 1952, p. 579-580.

Describes experiments on cold-worked Fe carried out in the Defence Research Laboratories, Melbourne.

8127 Properties of Amorphous Selenium and Its Use as an Optical Material. H. A. Gebbie and C. G. Cannon. *Journal of the Optical Society of America*, v. 42, Apr. 1952, p. 277.

Experimental results are briefly charted and illustrated.

8128 Heat Transfer in Spiral Coils. M. A. Noble, J. S. Kamlani, and J. J. McKetta, Jr. *Petroleum Engineer*, v. 24, Apr. 1952, p. C7-C8, C10, C13-C14, C16, C20.

Film coefficients and pressure drops for spiral tubing are shown to be much higher than corresponding film coefficients for straight tubes. Includes details of calculation methods and graphical interpretation. 15 ref.

8129 Electrodynamic Displacement of Atomic Energy Levels. I. Superfine Structure. Robert Karplus and Abraham Klein. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 972-984.

Theoretical and mathematical analysis of the above.

8130 The Response of Anthracene Scintillation Crystals to High Energy μ-Mesons. Theodore Bowen and Francis X. Roser. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 992-997.

Above was determined using μ-mesons in the cosmic radiation at sea level with energies from 29 Mev. to greater than 1 Bev. The light output was found to have a sizeable fluctuation for mesons of the same initial energy, due to ionization loss straggling. The scintillation efficiency of the phosphor was found to decrease for increasing specific ionization, in agreement with the work of others on electrons and protons.

8131 Neutron Capture γ-Rays From Phosphorus, Sulfur, Chlorine, Potassium, and Calcium. B. B. Kinsey, G. A. Bartholomew, and W. H. Walker. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1012-1023.

Contains the results of a study of the neutron capture γ-rays produced by a group of adjacent elements.

8132 Some Experiments on Flow in the Unsaturated Helium II Film. Earl Long and Lothar Meyer. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1030-1035.

The mass flow in adsorbed layers of helium was measured. Superfluidity occurs at all temperatures below the λ-temperature of the bulk liquid down to 1½ statistical layers. The bearings of these results on the thermodynamics of transition HeI-HeII in adsorbed layers is discussed.

8133 Masses of Pb^{208}, Th^{232}, U^{234}, U^{235}, and U^{238}. George S. Stanford. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1039.

Mass spectrographic mass values were obtained for 5 of the isotopes of Pb, Th, and U.

8134 The M_5 and M_4 X-Ray Absorption Edges of Tantalum. Donald D. Doughty and J. W. McGrath. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1040.

8135 Dielectric Constant and Permeability of Various Ferrites in the Microwave Region. Tosihiko Okamura, Tadao Fujimura, and Muneyuki Data. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1041-1042.

8136 Transmission and Spectral Response of Lead Sulfide and Lead Telluride. M. A. Clark and R. J. Cashman. *Physical Review*, ser. 2, v. 85, Mar. 15, 1952, p. 1043-1045.

8137 Spontaneous Fission. Emilio Segre. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 21-28.

Summarizes work on spontaneous nuclear fission performed at Los Alamos before 1946. Describes experimental technique used to detect fission in the heavy α-active elements. Apparatus diagrams. 17 ref.

8138 Nuclear Elastic Scattering of High Energy Protons. R. E. Richardson, W. P. Ball, C. E. Leith, Jr., and B. J. Moyer. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 29-41.

Deals with differential elastic scattering cross sections of C, Mg, Al, Si, S, Cu, Ag, Ta, W, Pb, and Bi for 340-Mev. protons. Apparatus diagrams and graphs. 17 ref.

8139 Convergence of Intermolecular Force Series. Franklin C. Brooks. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 92-97.

In reference to the above, considers uncertainties arising from use of the expansion of electrostatic interaction between atoms and suggests a method of overcoming them. 20 ref.

8140 Dielectric Constant in Perovskite Type Crystals. John H. Barrett. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 118-120.

Extends Slater's theory of the dielectric constant in $BaTiO_3$ and obtains an expression for the constant good at all temperatures.

8141 A Spin-Wave Treatment of the Saturation Magnetization of Ferrites. Harvey Kaplan. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 121.

8142 Electrical Properties of the Sodium Tungsten Bronzes. Hellmut J. Juretschke. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 124-125.

Discusses and interprets recent results of Brown and Banks.

8143 The Dark Current in the Intermittent Glow Discharge in Hydrogen. Herman Ritow. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 130-131.

A study of various characteristics of the above which is of relatively high magnitude and has a directional reversal. Circuit diagram and graphs.

8144 The Dispersion of Permittivity and Conductivity of Semiconductors. R. E. Burgess. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 131-132.

Theoretical and mathematical treatment of Ni-Zn ferrites.

8145 The Inelastic Scattering of Fast Neutrons From Iron. P. H. Stelson and W. M. Preston. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 132-133.

Presents a study of above and gives a method for separating low-lying energy levels in intermediate weight nuclei. Apparatus diagram and graph.

8146 Diffusion of Donor and Acceptor Elements Into Germanium. Calvin S. Fuller. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 136-137.

Tabular and graphical data for Sb and As diffusion.

8147 Measurement of Diffusion in Semiconductors by a Capacitance Method. K. B. McAfee, W. Shockley, and M. Sparks. *Physical Review*, ser. 2, v. 86, Apr. 1, 1952, p. 137-138.

Method described permits measurement of very small diffusion distances and very low impurity concentrations. It allows diffusion study from gradient established in the crystal at time grown. Experiments were performed with single crystals of Ge in which Ga was the uniformly distributed acceptor, and As was the nonuniform donor. Graphs.

8148* Magnetic Resonance in a System Containing Two Magnetic Sublattices. Roald K. Wangsness. *Physical Review*, ser. 2, v. 86, Apr. 15, 1952, p. 146-148.

Normal frequencies are calculated classically, including exchange, demagnetizing, and anisotropy fields. Ferromagnetic and antiferromagnetic resonance conditions are shown to be special cases of a general formula which is obtained. Discusses application of the Kittel ferromagnetic frequency. 17 ref.

8149* Ferroelectricity and Antiferroelectricity in Ceramic $PbZrO_3$ Containing Ba or Sr. Gen Shirane. *Physical Review*, ser. 2, v. 86, Apr. 15, 1952, p. 219-227.

A study of the above by dielectric, dilatometric, and calorimetric measurements. Reexamines the $(Pb\text{-}Ba)ZrO_3$ system for new transition data. Also investigates the $(Pb\text{-}Sr)ZrO_3$ and $(Pb\text{-}Ca)ZrO_3$ systems, comparing results with those of the $(Pb\text{-}Ba)ZrO_3$ system. Graphs, photographs, and tables. 15 ref.

8150* Chemical Effects in Nuclear Magnetic Resonance and in Diamagnetic Susceptibility. Norman F. Ramsey. *Physical Review*, ser. 2, v. 86, Apr. 15, 1952, p. 243-246.

An expression for the magnetic shielding of nuclei in solids and in molecules is developed, and an approximation is obtained that is particularly suited to substances containing heavy atoms. Temperature dependence of magnetic shielding is discussed. 15 ref.

8151* Crystal Structure of the Ferroelectric Phase in $PbZrO_3$ Containing Ba or Ti. Gen Shirane and Sadao Hoshino. *Physical Review*, ser. 2, v. 86, Apr. 15, 1952, p. 248-249.

A series of powder photographs with rising temperature was taken with Cu Kα radiation by using a high-temperature camera of 5.5 cm. radius. Discusses intensity anomalies. Diagram.

8152* Thermal Conductivity of Carbons and Graphite. S. Mrozowski. *Physical Review*, ser. 2, v. 86, Apr. 15, 1952, p. 251-252.

A note on some interesting characteristics of the above in relation to structure. Conductivities for variously-treated carbons are plotted as a function of temperature.

8153* Emission of the Atmospheric Oxygen Bands in Discharges and Afterglows. Lewis M. Branscomb. *Physical Review*, ser. 2, v. 86, Apr. 15, 1952, p. 258.

Briefly discusses conditions and mechanism for production of the above; and measurement of rotational and vibrational "temperatures." Diagram. 11 ref.

8154 The Relative Ionization Produced by Low Energy Protons, Deuterons and Alpha-Particles in Various Gases. P. R. Tunnicliffe and A. G. Ward. *Proceedings of the Physical Society*, v. 65, sec. A., Apr. 1, 1952, p. 233-240.

Mono-energetic neutrons were used to produce recoil protons, deuterons and α-particles in a proportional counter. The maximum pulse sizes produced by the different recoil particles are compared with the accurately known ratios of maximum recoil energies. 13 ref.

8155 The Inelastic Scattering of Very Slow Neutrons by Iron. R. Latham and J. M. Cassels. *Proceedings of the Physical Society*, v. 65, sec. A., Apr. 1, 1952, p. 241-245.

The increase with temperature of the total cross section of iron for very slow neutrons was measured with the help of a cyclotron and a neutron velocity selector. 12 ref.

8156 Analogies Between the Diffraction of Light and Electron Diffraction by Gas Molecules. L. Bru, M. P. Rodriguez, and R. Vega. *Proceedings of the Physical Society*, v. 65, sec. B., Apr. 1, 1952, p. 249-255.

Monochromatic light was diffracted by a unit formed by an ensemble of slits with a common axis, in which all periodicities which a molecule can exhibit are represented.

8157 The Electric Breakdown of Alkali Halide Crystals. J. H. Calderwood, R. Cooper, and A. A. Wallace. *Proceedings of the Physical Society*, v. 65, sec. B., Apr. 1, 1952, p. 301-302.

Measurements were made with d.c. voltages applied to specimens of KCl and NaCl prepared from single crystals.

8158 Physics in the Atomic Energy Program. Thomas H. Johnson. *Physics Today*, v. 5, Apr. 1952, p. 14-19.

8159 Fluid Flow Losses Through Orifices. Nils M. Sverdrup. *Product Engineering*, v. 23, May 1952, p. 237.

Graph and equations.

8160 Range-Energy Relations for Electrons and the Determination of Beta-Ray End-Point Energies by Absorption. L. Katz and A. S. Penfold. *Reviews of Modern Physics*, v. 24, Jan. 1952, p. 28-44.

All the methods commonly used to determine the ranges of β-rays from absorption curves are discussed, and a new method developed by the authors is presented. Includes data for β-ray transmission and absorption by various thicknesses of Al. 61 ref.

8161* A Note on the Vortex Patterns in the Boundary Layer Flow of a Swept-Back Wing. Joseph Black. *Journal of the Royal Aeronautical Society*, v. 56, Apr. 1952, p. 279-285.

Growth of the vortices in the boundary layer, and the flow within them, was studied. Unexpected flow conditions, especially at the higher incidences, were discovered. They are believed to be unknown, and hitherto unsuspected.

8162 The Flow of Gases Through Capillaries. J. A. W. Huggill. *Proceedings of the Royal Society*, ser. A, v. 212, Apr. 8, 1952, p. 123-136.

The flows of H_2, He, N_2, C_2H_4, A, and CO_2 through capillaries were measured at room temperature in the region of transition between molecular and viscous flow for capillary walls of polymethyl-methacrylate and gold. Results are compared with recent theories.

8163 Multi-Oscillator Processes in the Scattering of Neutrons by Crystals. G. L. Squires. *Proceedings of the Royal Society*, v. 212, ser. A, Apr. 22, 1952, p. 192-206.

A neutron velocity selector was used to investigate variation of scattering of slow neutrons with temperature of the scatterer. polymethylmethacrylate and gold. Results are compared with Weinstock's theory. Graphs. 12 ref.

8164 Magnetic Properties of Ferrite Materials. Ephraim Gelbard. *Tele-Tech*, v. 11, May 1952, p. 50-52, 82, 84.

States that the wide range of permeability, saturation, flux

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density, and volume resistivity make "Ferramics" useful in numerous magnetic-core applications. Developmental types show promise for computer and memory systems. Properties of 7 grades of ferrite are shown. Graphs and tables.

8165* Physical Effects of High Pressure. P. W. Bridgman. *Times Review of the Progress of Science*, Spring 1952, p. 1-4.

Considers apparatus and techniques, and effects on compression of fluids and solids, freezing, polymorphic forms, atomic structure, fracture of steel, etc.

8166* Electron-Nuclear Showers and the Nuclear-Cascade Process. (In Russian.) N. G. Birger and I. L. Rozental. *Uspekhi Fizicheskikh Nauk*, v. 45, Sept. 1951, p. 104-112.

A review, mainly of Russian developments in atomic physics. 31 ref.

8167* Heat-Release of Wires to Stagnant Air. Contribution to Its Quantitative Determination. (In German.) J. Fischer. *Zeitschrift für angewandte Physik*, v. 4, Mar. 1952, p. 90-94.

Theoretical study of heat loss of electrically heated wires under different conditions. Diagrams and graphs. 10 ref.

8168* Thermal Stresses and Deformations in an Elastic Body Subjected to Steady Two-Dimensional Heat Flow. (In German.) Fritz Salzmann. *Zeitschrift für angewandte Mathematik und Physik*, v. 3, Mar. 15, 1952, p. 129-148.

8169* Term Analysis of the Emission Bands of Sulfide Phosphors. III. (In German.) Rudolph Schenck. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie*, v. 56, Feb. 1952, p. 132-136.

Results of above analysis are charted and discussed.

8170* Structural Changes of Crystals by Bombardment With α-Particles. (In German.) Berthold Stech. *Zeitschrift für Naturforschung*, v. 7a, Feb. 1952, p. 175-185.

Debye-Scherrer diagrams indicate that bombarding certain types of crystals with large amounts of α-particles causes changes in their structures. Several examples are described and illustrated. For instance Se was converted from the amorphous to the most crystalline modification by this means. 28 ref.

8171* Perturbing-Center and Inherent Semiconduction of Intermetallic Compounds. (In German.) E. Justi and G. Lantz. *Zeitschrift für Naturforschung*, v. 7a, Feb. 1952, p. 191-200.

Describes investigation of effect of structure on the very high maxima of electrical resistance of Cd-Sb alloys. Purest stoichiometric CdSb was found to be a true semi-conductor because the Brillouin zones are fully occupied by electrons. Study deals also with room-temperature resistance of perturbing-center semiconductors formed by adding other metals to CdSb. Special properties are discussed. Diagrams and graphs. 19 ref.

8172* Thermoelectric Force Measurements on Cuprous Oxide at High Temperatures. (In German.) Helmut Müser and Helmut Schilling. *Zeitschrift für Naturforschung*, v. 7a, Feb. 1952, p. 211-212.

Study was made to determine whether CuO is, at high temperature, an atmospheric or deficit-electron semiconductor. Graph shows variation with time of thermoelectric force during oxidation with oxygen-rich gas.

8173* The Electrostatic Lattice Energy of Finite Sections of Heteropolar Crystals. (In German.) Otto Emersleben. *Zeitschrift für physikalische Chemie*, v. 199, Jan. 1952, p. 170-190.

Describes an improved method for determining above and shows that the results can be used to compute the effect of grain size on the electrostatic share of the dissociation energy of an ionic crystal. 13 ref.

8174* The Waviness of the Radiation of a High-Pressure D.C. Mercury Lamp in the Tenth-Millimeter Wavelength Range. (In German.) H. Säufferer. *Zeitschrift für Physik*, v. 131, no. 3, 1952, p. 376-384.

Describes experimental study of variation of radiation intensity of above Hg lamp in order to gain information on temperature effect on radiation. Arrangement and procedure of experimentation are described and illustrated; data are charted. 15 ref.

8175* Theory of Emission and Adsorption of High-Pressure Ares in the Tenth-Millimeter Wavelength Range. (In German.) G. Hettner. *Zeitschrift für Physik*, v. 131, no. 3, 1952, p. 385-394.

Theoretical and experimental study of above. Data are tabulated. 19 ref.

8176* Effect of Electrical Fields on Internal Friction of Liquids. (In German.) Jan Van Calker and Bruno Aubke. *Zeitschrift für Physik*, v. 131, no. 4, 1952, p. 443-455.

Theory and measurements show that above effect on viscosity of dielectric liquids is caused by impurities (ionic effect) and by the heating effect of electric current. Tables and graphs. 24 ref.

8177* Photochemical Processes in Alkali-Halide Crystals. (In German.) Werner Martienssen. *Zeitschrift für Physik*, v. 131, no. 4, 1952, p. 488-504.

Deals with photochemical processes induced by ultraviolet light and X-rays. The reaction products are investigated with aid of absorption spectra; it is proposed that results be explained by Hippel's and Pringsheim's theories. Includes graphs and tables. 33 ref.

8178* Determining the Radial Temperature Distribution of Maximum-Pressure Hg Ares From the Densities of Dome Rays of Self-Reversing Lines. (In German.) Wilhelm Göing. *Zeitschrift für Physik*, v. 131, no. 4, 1952, p. 603-618.

Describes method of measuring above, results showing an average temperature of 8000 ± 200°K. Graphs and tables. 21 ref.

8179* Thermal Damping of Elastic Vibrations. (In German.) E. Schreuer. *Zeitschrift für Physik*, v. 131, no. 4, 1952, p. 619-628.

Describes calculation method for the above. Results are compared with those obtained by other methods. Tables and graphs.

Miscellaneous Publications

8180 Experimental Analysis of Vibrations. Werner Meyer-Eppler. *Ergebnisse der exakten Naturwissenschaften*, v. 23, 1950, p. 53-126. (GC21 Er38)

Illustrated description of methods includes brief indication of practical uses. Tables, diagrams, and photographs. 180 ref.

8181 Seignette Electricity. (In German.) Hans Baumgartner. Franco Jona, and Werner Känzig. *Ergebnisse der exakten Naturwissenschaften*, v. 23, 1950, p. 235-282. (QC21 Er38)

Discusses theory and practice of above without and within the cubic range. Three types of crystals are shown to be Seignette electric (ferroelectric), namely Seignette salts, primary alkali phosphates and arsenates, and barium titanate. Diagrams, tables, and graphs. 91 ref.

8182 Theory of Superconduction. (In German.) Heinz Koppe. *Ergebnisse der exakten Naturwissenchaften*, v. 23, 1950, p. 283-358. (QC21 Er38)

The various chapters discuss the thermodynamic theory; the ordered phase of the superconducting electrons; Heisenberg's Theory; and electrodynamic behavior of superconductors. Includes graphs and diagrams. 14 ref.

8183 Wind-Tunnel Corrections at High Subsonic Speeds Particularly for an Enclosed Circular Tunnel. B. Göthert. National Advisory Committee for Aeronautics, Technical Memorandum 1300, Feb. 1952, 43 pages. (Translated from Deutsche Versuchsanstalt für Luftfahrt, e.v., Institut für Aerodynamik, Forschungsbericht 1216, May 1940.) (TL570 Un3tm)

After a review of existing publications on wind-tunnel corrections at high Mach numbers, an approximate method is given for determining the corrections due to model displacement and wake displacement behind resistance bodies and due to lift. The relations are investigated with particular detail for fuselages and wings of various spans in closed circular tunnels. A comparison is made between the computations and tests in the DVL high-speed wind tunnel.

8184 A Simple Numerical Method for the Calculation of the Laminar Boundary Layer. K. Schröder. National Ad-

visory Committee for Aeronautics, Technical Memorandum 1317, Apr. 1952. 47 pages. (Translated from Zentrale für wissenschaftliches Berichtswesen der Luftfahrtforschung des Generalluftzeugmeisters, Forschungsbericht 1741, Feb. 25, 1943.) (TL570 Un3tm)

8185 Investigations of the Boundary-Layer Control on a Full Scale Swept Wing With Air Bled Off From the Turbojet. P. Rebuffet and Ph. Poisson-Quinton. National Advisory Committee for Aeronautics, Technical Memorandum 1331, Apr. 1952, 43 pages. (Translated from *La Recherche Aeronautique, O.N.E.R.A.*, Mar.-Apr. 1950, p. 39-54.) (TL570 Un3tm)

8186 Development of a Laminar Boundary Layer Behind a Suction Point. W. Wuest. National Advisory Committee for Aeronautics, Technical Memorandum 1336, Mar. 1952, 18 pages. (Translated from *Ingenieur Archiv*, v. 17, 1949, p. 199-206.) (TL570 Un3tm)

Mathematical analysis plus graphic interpretation.

8187 Orientation of Orifices on Bodies of Revolution for Determination of Stream Static Pressure at Supersonic Speeds. Morton Cooper and Clyde V. Hamilton. National Advisory Committee for Aeronautics, Technical Note 2592, Jan. 1952, 26 pages. (TL570 Un3t)

Experimental data obtained in the Langley 4x4 ft. supersonic tunnel for a parabolic body of revolution of large fineness ratio at a Mach number of 1.59 and a Reynolds number of 3.6×10^6 were analyzed to locate positions at which static-pressure orifices indicate a constant static pressure independent of the pitch-yaw attitude of the body. The results show that, by locating two orifices at symmetrical radial positions with respect to the angle-of-attack plane, and by using single pressure given by the average of the two orifice readings, applicable pitch-yaw ranges can be obtained while a constant static pressure is maintained.

8188 Experimental Investigation of an NACA 64A010 Airfoil Section With 41 Suction Slots on Each Surface for Control of Laminar Boundary Layer. Dale L. Burrows and Milton A. Schwartzberg. National Advisory Committee for Aeronautics, Technical Note 2644, Apr. 1952, 37 pages. (TL570 Un3t)

8189 Generalized Linearized Conical Flow. W. D. Hayes, R. C. Roberts, and N. Haaser. National Advisory Committee for Aeronautics, Technical Note 2667, Mar. 1952, 47 pages. (TL570 Un3t)

A basic theory of the above for both inside and outside the Mach cone was developed and applied to several specific problems including unsteady-flow conditions. A triangular lifting wing in pitching and rolling with both subsonic and supersonic leading edges was investigated and pressure co-efficients obtained. A family of thin sweptback triangular wings having symmetrical thickness distribution was also investigated and analytical expressions for wave drag and pressure coefficients determined. 11 ref.

8190 Experimental Investigation of a 90° Cascade Diffusing Bend With an Area Ratio of 1.45:1 and With Several Inlet Boundary Layers. Daniel Friedman and Willard R. Westphal. National Advisory Committee for Aeronautics, Technical Note 2668, Apr. 1952, 29 pages. (TL570 Un3t)

8191 A Compressible-Flow Plotting Device and Its Application to Cascade Flows. Williard R. Westphal and James C. Dunavant. National Advisory Committee for Aeronautics, Technical Note 2681, Apr. 1952, 21 pages. (TL570 Un3t)

Describes simplified method for solution of 2-dimensional compressible flows through well-defined passages. This method makes use of plastic cams which automaticaly set the length-to-width ratio of rectangles formed by streamlines and equipotential lines represented by spring-steel wires. Pressure distributions around 4 cascades of turbine blades and along the surface of a choked nozzle determined by this method are shown to compare well with experimental results. Diagrams, illustrations, and graphs.

8192 Experimental Investigation of Heat Transfer Through Laminar and Turbulent Boundary Layers on a Cooled Flat Plate at a Mach Number of 2.4. Ellis G. Slack. National Advisory Committee for Aeronautics, Technical Note 2686, Apr. 1952, 31 pages. (TL570 Un3t)

8193 Theoretical and Experimental Analysis of One-Dimensional Compressible Flow in A Rotating Radial-Inlet Impeller Channel. Seymour Lieblein. National Advisory Committee for Aeronautics, Technical Note 2691, Apr. 1952, 57 pages. (TL570 Un3t)

8194 Use of Source Distributions For Evaluating Theoretical Aerodynamics of Thin Finite Wings at Supersonic Speeds. John C. Evvard. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 71-102. (Technical Report 901.) (TL521 Un3r)

A series of publications on the above is summarized, extended, and unified. 25 ref.

8195 Linearized Compressible-Flow Theory For Sonic Flight Speeds. Max A. Heaslet, Harvard Lomax, and John R. Spreiter. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 195-210. (Technical Report 956.) (TL521 Un3r)

Several examples are solved. 21 ref.

8196 The Calculation of Downwash Behind Supersonic Wings With An Application to Triangular Plan Forms. Harvard Lomax, Loma Sluder, and Max A. Heaslet. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 211-229. (Technical Report 957.) (TL521 Un3r)

8197 Laminar Mixing of a Compressible Fluid. Dean R. Chapman. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 231-237. (Technical Report 958.) (TL521 Un3r)

Theoretical investigation and method for calculating the velocity profile in the mixing layer for an arbitrary value of free-stream Mach number. Detailed velocity profiles for free-stream Mach numbers of 0,1,2,3, and 5.

8198 One-Dimensional Flows of An Imperfect Diatomic Gas. A. J. Eggers, Jr. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 239-249. (Technical Report 959.) (TL521 Un3r)

Expressions are developed for analyzing the above. Flow through normal and oblique shocks in free air at sea level was investigated. 21 ref.

8199 The Application of Green's Theorem to the Solution of Boundary-Value Problems in Linearized Supersonic Wing Theory. Max A. Heaslet and Harvard Lomax. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 257-270. (Technical Report 961.) (TL521 Un3r)

23 references.

8200 Investigation With An Interferometer of the Turbulent Mixing of a Free Supersonic Jet. Paul B. Gooderum, George P. Wood, and Maurice J. Brevoort. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 289-305. (Technical Report 963.) (TL521 Un3r)

Free turbulent mixing of a supersonic jet of Mach number 1.6 was experimentally investigated. Describes interferometer. Density and velocity distributions through the mixing zone were obtained. 11 ref.

8201 The Effects of Variations in Reynolds Number Between 3.0×10^6 and 25.0×10^6 Upon the Aerodynamic Characteristics of a Number of NACA 6-Series Airfoil Sections. Laurence K. Loftin, Jr., and William J. Bursnall. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 307-326. (Technical Report 964.) (TL521 Un3r)

8202 The Longitudinal Stability of Elastic Swept Wings at Supersonic Speed. C. W. Firck and R. S. Chubb. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 327-338. (Technical Report 965.) (TL521 Un3r)

Above was calculated by application of linearized lifting-surface theory. 11 ref.

8203 Theoretical Life and Damping in Roll at Supersonic Speeds of Thin Sweptback Tapered Wings With Streamwise Tips, Subsonic Leading Edges, and Supersonic

32. *Physics*

Trailing Edges. Frank S. Malvestuto, Jr., Kenneth Margolis, and Herbert S. Ribner. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 395-410. (Technical Report 970.) (TL521 Un3r)

Includes design curves.

8204 Theoretical Stability Derivatives of Thin Sweptback Wings Tapered to a Point With Sweptback or Sweptforward Trailing Edges for a Limited Range of Supersonic Speeds. Frank S. Malvestuto, Jr., and Kenneth Margolis. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 411-424. (Technical Report 971.) (TL521 Un3r)

8205 The Effect of Torsional Flexibility on the Rolling Characteristics at Supersonic Speeds of Tapered Unswept Wings. Warren A. Tucker and Robert L. Nelson. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 425-452. (Technical Report 972.) (TL521 Un3r)

8206 Linear Theory of Boundary Effects in Open Wind Tunnels With Finite Jet Lengths. S. Katzoff, Clifford S. Gardner, Leo Diesendruck, and Bertram J. Eisenstadt. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 509-545. (Technical Report 976.) (TL521 Un3r)

Electrical analogies for solving flow in open wind tunnels are outlined. Two types are described. Solutions are derived for 4 types of 2-dimensional open tunnels. General method for calculating boundary effect in an open circular wind tunnel of finite jet length. Numerical results. 17 ref.

8207 On Stability of Free Laminar Boundary Layer Between Parallel Streams. Martin Lessen. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950" p. 571-579. (Technical Report 979.) (TL521 Un3r)

Analysis and calculations on the above were made for an incompressible fluid using the Tollmien-Schlichting theory of small disturbances. 22 ref.

8208 Line-Vortex Theory for Calculation of Supersonic Downwash. Harold Mirels and Rudolph C. Haefeli. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 635-650. (Technical Report 983.) TL521 Un3r)

8209 The Reversibility Theorem For Thin Airfoils in Subsonic and Supersonic Flow. Clinton E. Brown. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 669-671. (Technical Report 986.) (TL521 Un3r)

8210 An Analysis of Supersonic Aerodynamic Heating With Continuous Fluid Injection. E. B. Klunker and H. Reese Ivey. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 701-710. (Technical Report 990.) (TL521 Un3r)

Analysis includes calculations of cooling requirements and equilibrium surface temperatures for flat plates and for flat porous surfaces with several rates of fluid injection at Mach numbers from 5 to 15 and altitudes from sea level to 200,000 ft. Some calculations of skin friction are also included.

8211 Blockage Corrections for Three-Dimensional-Flow Closed-Throat Wind Tunnels, With Consideration of the Effect of Compressibility. John G. Herriot. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 771-783. (Technical Report 995.) (TL521 Un3r)

Theoretical blockage corrections. Summary and unification of literature. 14 ref.

8212 Further Experiments on the Flow and Heat Transfer in a Heated Turbulent Air Jet. Stanley Corrsin and Mahinder S. Uberoi. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 859-875. (Technical Report 998.) (TL521 Un3r)

Apparatus and procedure. Results charted and analyzed. Diagrams and illustrations. 24 ref.

8213 Boundary Layer Flow in the Corner of a Diffuser. J. B. Jones and R. C. Binder. Engineering Experiment Station, Purdue University, Research Series 115, Mar. 1952, 39 pages. (*Engineering Bulletin*, v. 36, no. 2.) (Tl P97r)

Experiments were made on the flow of air through a square diffuser having an 8-in. inlet and a divergence angle of 8°. Inlet air velocity was 165 fps. Velocity traverses were made in the corner of the diffuser at several stations along its length, and static-pressure distributions along and across the diffuser were measured at 3 relative values of upstream turbulence intensity. Secondary flow was observed by use of smoke and by means of lampblack-kerosene flow patterns. Conclusions are summarized.

8214 Pile Transfer Functions. Joseph P. Franz. U. S. Atomic Energy Commission, AECD-3260, July 18, 1949, 12 pages. (UF767 Un3m)

Presents a detailed derivation of the transfer function of a critical pile and relates this steady-state description and the transient response to a step-function change of reactivity.

8215 Experimental Production of a Divergent Chain Reaction. E. Fermi. U. S. Atomic Energy Commission, AECD-3269, Jan. 4, 1952, 47 pages. (UF767 Un3m)

Presents a description of the construction and operation of the first chain-reacting pile. The pile was constructed in the West Stand Laboratory at Chicago during Oct. and Nov. 1942 and was operated for the first time on Dec. 2, 1942. Includes details of calculations and performance data.

8216 Slow Neutron Transmission of Thorium. W. W. Havens, Jr., and L. J. Rainwater. U. S. Atomic Energy Commission, AECD-3288, Apr. 17, 1951, 6 pages. (UF767 Un3m)

Results of investigation of the above in various regions are charted and briefly discussed.

Books

8217 Industrial Magnetic Testing. N. F. Astbury. 132 pages. 1952. Institute of Physics, London. (QC761 As81i)

Deals with: general concepts of magnetism; the magnetic circuit and its associated electrical circuit; instruments; permeability and hysteresis measurements; power loss measurements; alternating current bridge and potentiometer measurements, with a note on pulse-testing; permanent magnet testing and the measurement of magnetic field strengths; M.K.S. units in magnetic measurements; eddy current losses in thin plates; general properties of materials, and some special properties of materials.

8218 Optik; ein Lehrbuch der elektromagnetischen Lichttheorie (Optics, A Textbook of the Electromagnetic Theory of Light.) Max Born. 591 pages. 1933. Julius Springer, Berlin, Germany. (Reproduced by Edwards Bros., Ann Arbor, Mich., 1943.) (QC371 B640)

This systematic survey of theoretical optics includes chapters on the Electromagnetic Theory of Light for Transparent Nonchromatic Substances; Geometrical Optics; Interference; Refraction; the Optics of Crystals, Metals, and Molecules; and Emission, Absorption, and Dispersion. Diagrams, tables, graphs, photographs, and numerous references.

8219 Theorie des Atomkerns. (Theory of the Atomic Nucleus). W. Heisenberg. 162 pages. 1951. Bernhard Croninger, Göttingen, Germany. (QC173 H63t)

Diagrams, graphs, tables, and numerous references supplement this report of a lecture on the theoretical structure of atomic nuclei, including a discussion of nuclear models, internuclear forces, scattering of uncharged particles, distribution of neutrons in heavy nuclei, light quanta, electrons, neutrinos, nuclear fission, and meson theory of nuclear forces.

8220 Proceedings of the Midwestern Conference on Fluid Dynamics; First Conference. 1951. 398 pages. J. W. Edwards, Ann Arbor, Mich. (QA901 M58p)

Proceedings of conference held May 12-13, 1950, at University of Illinois. Addresses on the turbulence problem and on aerophysics research are followed by groups of papers as follows: 6 on aerodynamics or external flow; 6 on astrophysics, computing machines, mathematical theory of fluid dynamics, or meterology; 5 on chemical engineering, 5 on hydraulics; and 7 on mechanical engineering or internal flow.

8221 Theorie und Lösungsmethoden des Mehrteilchenproblems der Wellenmechanik. (Theory and Methods of Solving Multiparticle Problems of Wave Mechanics.) P. Gombás. 268 pages. 1950. Verlag Birkhauser, Basel, Switzerland. (QC174.2 G58t)

Part I deals with the general wave-mechanical theory of the above problem. Part II summarizes and explains various methods for its solution. Includes tables, graphs, diagrams, and numerous references.

8222 Kolebaniia i Volny. Vvedenie v Akustiku, Radiofiziku, i Optiku. (Vibration and Waves. Introduction to Accustics, Radiophysics, and Optics.) G. S. Gorelik, 551 pages. 1950. Government Scientific-Technical Publishing House for Technical Theoretical Literature, Moscow and Leningrad, U.S.S.R. (QC231 G66K)

8223 Quantum Theory of Matter. John C. Slater. 1951. 528 pages. McGraw-Hill, New York. (QC174.1 SL15q)

In his treatment, the author has attempted to give something of the feeling of history, rather than presenting the subject matter as a formal set of postulates and consequences. He has attempted to go directly from fundamentals to applications to the properties of matter. The book is on a level where the beginner, with a fair knowledge of mathematics and mathematical methods, and of the experimental side of atomic structure, can follow it without any other study of quantum mechanics. Each chapter is followed by a series of problems.

See also:
7180 (study of sliding friction)
7386 (a.c. induction flow meter)
7541 (noise field of turbojet)
7822 (specific heat of $BaTiO_3$)
8280 (emissivity of ceria)
8288 ("Oxide-Coated Cathode"—book)
8291 ("Monographs on Electrokinetics")

33. ELECTRICITY AND ELECTRONICS

8224 Computing Machines in Aircraft Design. Charles R. Strang. *Aero Digest*, v. 64, Apr. 1952, p. 32, 34, 36, 38, 41-42, 44.

Describes everyday use of new "miracle" electronic calculators.

8225* Problem of Voltage Transformation Above 220 Kv. for Transmission of Large Amounts of Power for Long Distances. (In Russian.) M. A. Basov. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Sept. 1951, p. 1265-1283.

The use of split conductors and longitudinal compensation for transmission of 500,000-600,000 kw. per day at voltages up to 400 kv. is discussed. Data are charted.

8226* An Electronic Magnet Current Stabilizer. J. Schutten. *Applied Scientific Research*, v. 2, sec. B, no. 4, 1652, p. 249-263.

Above was developed, capable of keeping constant the magnet current of an isotope separator to 1:20,000. Easy adjustment of current is obtained by setting a 4-step decade resistor. By using a contact-modulated d.c. amplifier instead of applying the usual galvanometer-phototube-amplifier method, the apparatus is made insensitive to overloading and vibrations.

8227* A 3 kVA Electronic A.C. Stabilizer. J. D. Hoepelman and J. Schutten. Applied Scientific Research, v. 2, sec. B, no. 5, 1952, p. 361-366.

Above was stabilized by employing closed-loop electronic stabilization, operating in 2 stages and giving a discontinuous correction in steps of 1% of the nominal supply voltage as well as continuous correction up to a maximum of 1% of the nominal supply voltage. By this method, output was experimentally stabilized within a maximum variation of 0.25% of the nominal supply voltage.

8228* A Simple Electronic Digital Computer. W. L. Van Der Poel. *Applied Scientific Research*, v. 2, sec. B, no. 5, 1952, p. 367-400.

Describes the logical principles of above computer simplified to the utmost practical limit at the sacrifice of speed. Essential in the computer is that the control registers form part of the arithmetic unit, which results in a very simple method for using sub-programs. The arithmetic unit consists of 2 non-calculating registers and an adding unit for adding 3 digits together at a time. No decoder is required. Multiplication and division must be programmed. Examples are given. Advantages and drawbacks are mentioned. A machine based on these principles has been built in Holland and has given satisfactory results. 17 ref.

8229 Electromagnetic Energy Density and Flux. C. O. Hines. *Canadian Journal of Physics*, v. 30, Mar. 1952, p. 123-129.

Discusses Poynting's and Maconald's theorems. In a comparison of many results derived from the two, Macdonald's theorem exhibits sufficient superiority to warrant its consideration more generally in electromagnetics.

8230* Production of Impulses of Very Short Duration by Means of an Oscillating Circuit Excited by Shock and Shunted by a Germanium Crystal. (In French.) Hermann Mayer. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 10, 1952, p. 1131-1133.

Optimum conditions for the above are calculated. Circuit diagram.

8231* Operation of a Hollow-Cathode Water-Cooled Lamp, in an Atmosphere of Helium. (In French.) Jean Roig and Maurice Becart. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Mar. 17, 1952, p. 1262-1264.

Presents theoretical analysis and graphical interpretation of the above, as affected by voltage and He pressure.

8232* Automatic Engine Controls and Their Application. William L. Stetler. *Diesel Power*, v. 30, Apr. 1952, p. 84-86.

Discusses some of the applications, operation, service and maintenance procedures for automatic controls in general.

8233* Governing Mack's Diesels. Merrill C. Horine. *Diesel Power*, v. 30, Apr. 1952, p. 92-96.

Shows how a compensating control system provides torque control, speed droop, and automatic variation of injection timing in addition to speed control.

8234* A High-Speed Recording Oscillograph. I. S. Blumenthal and A. R. Eckels. *Electrical Engineering*, v. 71, May 1952, p. 440-445.

Makes ink records on a fast-moving chart of voltages having frequency components ranging from d.c. to 200 cycles per sec. Basic element of the instrument, a servomechanism, is a D'Arsonval meter movement with no restoring springs. Block and circuit diagrams, and photographs.

8235* Permanent Magnets From Ultrafine Iron Powder. Bernard Kopelman. *Electrical Engineering*, v. 71, May 1952, p. 447-451.

Discusses theory and properties of above which compare favorably with Alnico magnets. Diagrams and graphs. 10 ref.

8236* Control of a 65-Watt 2-Phase Servometer With a Magnetic Amplifier. F. S. Malick. *Electrical Engineering*, v. 71, May 1952, p. 466-468.

Describes the amplifier and a self-saturating circuit for an airborne application. Circuit diagrams; and design and performance curves.

8237* Development of 40-Volt Selenium Rectifier Plates. J. T. Cataldo. *Electrical Manufacturing*, v. 49, May 1952, p. 108-112, 328, 330.

Operating characteristics and temperature derating curves above 35°C. are given.

8238* Selecting an Embedment System For Electronic Components. Donald G. Heitert and Henry W. Niemann. *Electrical Manufacturing* v. 49, May 1952, p. 113-117, 322, 324, 326, 328.

A step-by-step report of one company's experience that answers these questions: What factors affect the choice of the embedment resin? How are the most effective production techniques set up?

33. *Electricity and Electronics*

8239* A Simple Valve Comparator. B. C. Foster. *Electronic Engineering*, v. 24, May 1952, p. 220-223.

Describes inexpensive tube comparator designed to give more adequate information than those simply giving a meter indication of the mutual conductance. Circuit diagrams.

8240* The Activities and Equipment of an Industrial Electronics Laboratory. Parts 4 and 5 (Concluded). G. H. Hickling. *Electronic Engineering*, v. 24, Apr. 1952, p. 148-151; 236-238.

Covers special purpose electronic instruments, capacitance gage circuits, recording equipment, and electronic measuring systems. Part 5 deals with design of equipment. 19 ref.

8241* Some Recently Developed Cold Cathode Glow Discharge Tubes and Associated Circuits. Parts 1 and 2. G. H. Hough and D. S. Ridler. *Electronic Engineering*, v. 24, Apr. 1952, p. 152-157; 230-235.

Topics discussed in 1st installment are: basic properties of cold-cathode trigger tubes, and transfer characteristics. Begins discussion of "noise". Part 2 includes basic trigger tube circuits, multicathode tube counters; and some electrode combinations. (To be continued.)

8242* Millimicrosecond Pulse Techniques. Part I. An Introduction To Techniques and the Development of Basic Circuits. N. F. Moody, G. J. R. Maclusky, and M. O. Deighton. *Electronic Engineering*, v. 24, May 1952, p. 214-219.

A review of work carried out during the last 3 yrs. on development of circuit techniques for ultrashort pulses and their application to problems of measurement in the laboratory. Discusses properties and application of the various circuit elements, with particular reference to secondary-emission pentodes. This leads to the development of several novel circuits. (To be continued.)

8243* A Versatile Phase-Angle Meter. G. N. Patchett. *Electronic Engineering*, v. 24, May 1952, p. 224-229.

Measures phase angle between a current and a voltage. Circuit diagrams, graphs, and tables.

8244 Guided Missile Test Center Telemetering System. James B. Wynn, Jr., and Sam L. Ackerman. *Electronics*, v. 25, May 1952, p. 106-111.

Equipment used at Air Force 1500-mile missile test center in the Caribbean is described.

8245 High-Speed Printer For Computers and Communications. John J. Wild. *Electronics*, v. 25, May 1952, p. 116-120.

Converts binary-coded information to typewritten copy in 80 columns on plain paper at a rate of 5 lines per sec. or more. Single type wheel rotates at 300 rpm., and 80 solenoid-controlled hammers strike at appropriate time to form lines of text.

8246 How to Design R-F Coupling Circuits. Warren B. Bruene. *Electronics*, v. 25, May 1952, p. 134-140.

A collection of engineering design information on the more commonly used systems. Provides a practical means for designing and adjusting circuits. A brief review of necessary preliminary calculations is presented.

8247 Computer-Recorder for Ratio Measurements. A. A. Gerlach and D. H. Pickens. *Electronics*, v. 25, May 1952, p. 145-147.

Multivibrators and a modified commercial recorder measure and record ratio between recurrent rates of pulses from 2 sources. Simplified version of system may be used to record ratio between any 2 phenomena, such as 2 d.c. voltages.

8248 A General Theory of Linear Signal Transmission Systems. L. A. Zadeh. *Journal of the Franklin Institute*, v. 253, Apr. 1952, p. 293-312.

Theoretical and mathematical treatment of above which contains the time domain and frequency domain approaches as special cases. The theory is based essentially on resolution of input signal into a set of "elementary" or component signals of some suitable, but otherwise arbitrary, type. 20 ref.

8249 Field Expandability in Normal Modes for a Multilayered Rectangular or Circular Wave-Guide. J. Van Bladel. *Journal of the Franklin Institute*, v. 253, Apr. 1952, p. 313-321.

Mathematical and theoretical. Intended to prove that the field in a multilayered rectangular or circular wave-guide can be expressed as a linear sum of normal modes, and to show how to obtain the field excited by a given current distribution in the guide.

8250 A Simple New Test for Harmonic-Frequency Losses in A.C. Machines. G. H. Rawcliffe and A. M. Menon. *Proceedings of the Institution of Electrical Engineers*, v. 99, pt. 2, Apr. 1952, p. 145-150.

The new test has the special merit that it uses only apparatus available in every routine-test department. Its principle is discussed first, and then certain operating points are considered. 12 ref.

8251 Electricity Supply—A Statistical Approach to Some Particular Problms. R. B. Rowson. *Proceedings of the Institution of Electrical Engineers*, v. 99, pt. 2, Apr. 1952, p. 151-167; disc., p. 167-172.

Presents a condensed summary of the more generally used statistical methods and application of some of these to generating stations and transmission systems is illustrated, particularly in connection with assessment of plant reliability. 78 ref.

8252 Vacuum-Tube Electrometer Applications. Joseph F. Keithley. *Instruments*, v. 25, Apr. 1952, p. 458, 506, 508-509.

Gives advantages and features of the above.

8253* Service Range for Air-to-Ground and Air-to-Air Communications at Frequencies Above 50 Mc. R. S. Kirby, J. W. Herbstreit, and K. A. Norton. *Proceedings of the I.R.E.*, v. 40, May 1952, p. 525-536.

Propagation aspects of air-to-ground and air-to-air communications are analyzed. Contours of constant received signal strength are shown in the form of lobes for various frequencies. Ground-station antenna-height diversity and tilted-array ground-antenna systems are discussed as a means of improving coverage as operating frequency is increased. 10 ref.

8254* Operational Analysis of Variable-Delay Systems. L. A. Zadeh. *Proceedings of the I.R.E.*, v. 40, May 1952, p. 564-568.

An operational method of analysis of variable-delay systems such as delay modulators and variable-path communication systems is developed. Special consideration is given to systems in which the variation in time delay is due to motion of the receiver or transmitter (source) or both. An operational relation is obtained for the correlation function of the output of a type-R system, and the result is applied to the determination of the correlation function of an fm. sound wave.

8255* Isotropic Artificial Dielectric R. W. Corkum. *Proceedings of the I.R.E.*, v. 40, May 1952, p. 574-587.

Isotropic artificial dielectric media composed of a 3 dimensional cubic array of metal or dielectric spheres were investigated. Theoretical expressions using the Clausius-Mossotti relation were derived for the index of refraction, dielectric constant, and magnetic permeability of this type of dielectric. Samples using steel and fused-quartz spheres were fabricated, and the dielectric properties measured in a rectangular wave-guide.

8256* Loss of Thermionic Emission in Oxide-Coated Cathode Tubes Due to Mechanical Shock. D. O. Holland, I. E. Levy, and H. J. Davis. *Proceedings of the I.R.E.*, v. 40, May 1952, p. 587-590.

Discusses various experimental results in connection with a little-understood type of failure which occurs quite generally among rugged tubes, that of failure or decrease of thermionic emission from the cathode as a result of shock. Means have been found for reducing the effect, and a theory which can possibly explain the cause is discussed. 21 ref.

8257* Efficiency of Thermal Electron Emission. M. J. O. Strutt. *Proceedings of the I.R.E.*, v. 40, May 1952, p. 601-603.

Under the assumption that power loss is by radiation only, this efficiency is calculated theoretically and its optimum value determined. Theoretical results are compared with practical values, and hints are given for obtaining better efficiency.

8258 Arc Quenching in Industrial Control. O. M. Bundy. *Iron and Steel Engineer*, v. 29, Apr. 1952, p. 84-89.

Discusses above problem. Describes a contactor designed on a new interrupting principle which allows use of 2 efficient arc-interrupting devices in series. Combines advantages of magnetic blowouts and double-break contacts. Diagrams and photographs.

8259 Statistical Errors in Measurement on Random Time Functions. W. B. Davenport, Jr., R. A. Johnson, and D. Middleton. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 377-388.

Above are analyzed for their dependence on the averaging interval, the method of averaging, and the statistics of the particular time function under observation. As a particular example, measurement of the power in a random-noise voltage of band width ω_T is analyzed in detail. Graphs. 30 ref.

8260 Effect of Thermal-Velocity Spread on the Noise Figure in Traveling-Wave Tubes. Philip Parzen. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 394-406.

Above computed by extending a method of Hahn. Presents new theory for diode-drift and traveling-wave tubes that includes the effect of the thermal-velocity spread at very high frequencies. Some computations are given for conditions met in practice. Graphs. 11 ref.

8261 A Study of Oxide-Coated Cathode by X-Ray Diffraction Method. Eiso Yamaka. *Journal of Applied Physics*, v. 23, Apr. 1952, p. 498-499.

Concerns crystal growth in relation to treatment temperature for BaO, (BaSr)O, and (BaSrCa)O; and relation of crystal size of BaO and thermionic emission. Graphs.

8262 Thermal Converters as AC-DC Transfer Standards for Current and Voltage Measurements at Audio Frequencies. Francis L. Hermach. *Journal of Research of the National Bureau of Standards*, v. 48, Feb. 1952, p. 121-138.

Thermal converters and associated equipment used as ac-dc transfer standards for the precise measurement of current and voltage at power and audio frequencies are described. Special tests to insure the required accuracy of the transfer standards are described, and results presented. A number of factors that limit the transfer accuracy of thermal converters have been discovered, and results of special tests and theoretical work to evaluate these factors are discussed. The solutions, by an approximation method, of certain pertinent nonlinear differential equations governing the heating of a conductor by an electric current are given. 10 ref.

8263* Influence of an Electric Field on an Electric Current in Metallic or Carbon Conductors. Oleg Yadoff. *Transactions of the New York Academy of Sciences*, ser. 2, v. 14, Feb. 1952, p. 165-171.

A theoretical and experimental treatment of the above. Diagrams.

8264* On the Theory of Secondary Electron Emission. J. L. H. Jonker. *Philips Research Reports*, v. 7, Feb. 1952, p. 1-20.

Presents calculations of the behavior of secondary electrons as a function of various parameters. Good agreement with experimental results. Graphs. 12 ref.

8265* Application of Multi-Hole Coupling to the Design of a Variable and Calibrated Waveguide Attenuator and Impedance. W. J. van de Lindt. *Philips Research Reports*, v. 7, Feb. 1952, p. 28-35.

Briefly describes behaviour of 2 parallel wave-guides, mutually coupled by n equidistant identical directional elements. A new type of calibrated variable attenuator and a variable impedance, capable of changing independently the amplitude and phase of the reflection coefficient are discussed. Diagrams, calibration curve, and photographs.

8266* Optimum Geometry of Microwave Amplifier Valves. G. Diemer and K. Rodenhuis. *Philips Research Reports*, v. 7, Feb. 1952, p. 36-44.

Based on Van der Ziel and Knol's theory of feedback amplifiers, it is shown that for u.h.f. amplifier valves a maximum frequency limit for amplification is reached if electrode areas are chosen so that useful capacitance equals the unavoidable parasitic capacitance. For optimum gain-bandwidth products the useful capacitance should be higher.

8267* Langmuir's ξ, η Tables for the Exponential Region of the I_a-V_a Characteristic. G. Diemer and H. Dijkgraaf. *Phillips Research Reports*, v. 7, Feb. 1952, p. 45-53.

Inter-electrode distances of modern microwave diodes and triodes are often so small that the normal operating point lies in the exponential part of the characteristic. A set of tables with voltage gradient at the anode as parameter is given from which the potential distribution in such cases can be derived.

8268* A New Kind of Radio Propagation at Very High Frequencies Observable Over Long Distances. D. K. Bailey, R. Bateman, L. V. Berkner, H. G. Booker, G. F. Montgomery, E. M. Purcell, W. W. Salisbury, and J. B. Wiesner. *Physical Review*, ser. 2, v. 86, Apr. 15, 1952, p. 141-145.

The discovery and some results of a preliminary investigation of a new type of weak vhf. propagation by means of the ionosphere are reported. This form of propagation appears to be observable over ranges out to about 2000 km. from the transmitter. The initial experiments on a frequency of 49.8 Mc. per sec. reveal the uninterrupted presence of observable signal over a test path of 1245 km., irrespective of season, time of day, or geomagnetic disturbance, though showing dependence in intensity on these factors. Graphs and diagrams.

8269 Positive Current Creep in Selenium Rectifiers. R. Cooper and J. Harrington. *Proceedings of the Physical Society*, v. 65, sec. B. Apr. 1, 1952, p. 303-304.

Data on above effect are charted and briefly discussed.

8270* Microwave Klystron Oscillators. Parts I and II. Joseph Racker and Lawrence Perenic. *Radio & Television News*, v. 47, Apr. 1952, p. 54-56, 122-123, May 1952, p. 64-66, 130-131.

Gives practical operating data on klystrons as used in present-day communications equipment. Covers use of reflex klystrons in modern circuitry.

8271* Automatic Control in the Engineering Industry. R. H. Kelsall. *Research*, v. 5, Apr. 1952, p. 181-187.

Describes in detail the particular problem of speed control and shows how the same principles may be applied to diverse equipment, including an automatic flame cutter.

8272 An Analysis of Crystal Diodes in the Millivolt Region. W. B. Whalley and C. Masucci. *Tele-Tech*, v. 11, May 1952, p. 40-42, 130-131.

Emphasis is placed on new materials suitable for lower voltage rectification.

8273 Nonlinear Elements and Applications in AF and RF Circuits. Part I. Hans E. Hollman. *Tele-Tech*, v. 11, Apr. 1952, p. 46-47, 127; May 1952, p. 56-57, 122, 124, 126, 128.

Saturable reactors, ferroelectric capacitors, and varistors comprise the 3 component groups. Details of new nonlinear resistor, termed the "polaristor", are explained. Applications of these devices as resistive detectors, overload protectors, modulators, harmonic generators, mixers, etc., are discussed. 14 ref.

8274* Printed Circuit Design Methods and Assembly Techniques. William A. Tewell. *Tele-Vision Engineering*, v. 3, Feb. 1952, p. 10-12; Mar. 1952, p. 19, 29-30.

Reports on printed circuits, foil-clad laminate assemblies, and practices which have been found to offer not only appreciable reductions in wiring and assembly costs, but flexible circuit reproduceability and miniaturization possibilities.

8275* Ceramics for Capacitors. Abraham Z. Dranetz. *Tele-Vision Engineering*, v. 3, Apr. 1952, p. 12-13.

A review of the physical and electrical characteristics of barium titanate ceramics and methods developed for their application in capacitors.

8276* Slow Electromagnetic Waves. (In Russian.) A. I. Akhiezer and Ia. B. Fainberg. *Uspekhi Fizicheskikh Nauk*, v. 44, July 1951, p. 321-368.

Presents a review of foreign and domestic methods of producing the above, in particular wave conductors (aerials), partially filled dielectrics and periodic structures without dielectrics (chain-type endovibrators.) 31 ref.

33. *Electricity and Electronics*

8277* Laminar Electron-Beam Tubes. Their Principles and Some of Their Applications. (In French.) Georges Pietri. *Vide*, v. 7, Jan. 1952, p. 1113-1122.

Presents a study of electron optics in which the rays are in the form of thin slices. After a theoretical discussion of the electronic problems, some particular applications are explained. Photographs and diagrams.

3278* Contribution to the Study of the Transverse Resistance of Oxide Cathodes. (In French.) Ch. Biguenet. *Vide*, v. 7, Jan. 1952, p. 1123-1130.

Describes an experimental method for easy determination of the above and of the resistance of the layer of oxides in series with the resistance of the interfacial zone between the oxides and the metal support. Modifications of these resistances were studied by this method as a function of the work function of the cathode. Tables, diagrams, and graphs. 10 ref.

8279* Abnormal Distribution of Velocities of Electrons Emitted by an Oxide Cathode in the Impulse Region. (In French.) R. Loosjes and C. G. J. Jansen. *Vide*, v. 7, Jan. 1952, p. 1131-1135.

Proposes certain explanations for phenomena observed in experiments on the above. Includes diagrams and graphs.

8280* Some Results on the Optical Emissivity and the Thermionic Emission of Ceria. (In French.) R. Uzan. *Vide*, v. 7, Jan. 1952, p. 1139-1140.

Describes the process of depositing ceria by cataphoresis and gives results obtained by measurement of spectral emission factors and the total amount of deposit. Includes graphs.

8281* Three-Valve Pulse Generator with Fixed Repetition Rate. F. A. Benson and G. V. Lusher. *Wireless Engineer*, v. 29, Apr. 1952, p. 90-91.

A 3-tube pulse generator with a fixed repetition rate is described. The positive pulses which it produces have a time of rise of slightly less than 0.5 microsec., and an amplitude of approximately 50V, and a width of about 1 microsec.

8282* Resonant Circuit With Periodically-Varying Parameters. P. Bura and D. M. Tombs. *Wireless Engineer*, v. 29, Apr. 1952, p. 95-100.

The circuit with periodically-varying resistance is studied both experimentally and theoretically. Experimentally, the periodic variation of the resistance is achieved by applying a voltage of a given frequency to the grid of a dynatron. Theoretically the problem consists of the solution of Mathieu's and Hill's equations.

8283* Duals: Two Formulas for the Price of One. *Wireless World*, v. 58, Apr. 1952, p. 152-155.

A discussion of Ge crystal triodes. Includes circuit diagrams and formulas.

8284* Theory of the Magnetron Amplifier. (In German.) Fritz Lüdi. *Zeitschrift für angewandte Mathematik und Physik*, v. 3, Mar. 15, 1952, p. 119-128.

8285* On the Theory of Filtration of Signals. (In English.) Lotfi A. Zadeh. *Zeitschrift für angewandte Mathematik und Physik*, v. 3, Mar. 15, 1952, p. 149-156.

Miscellaneous Publications

8286 An Integrating Amplifier for the Oscillographic Recording of Magnetic Flux. (In English.) S. Ekelöf, L. Bengtson, G. Kihlberg, and P. Leithammel. *Acta Polytechnica* (Electrical Engineering Series), v. 4, no. 3, 1951, 23 pages. (T1 Ac81)

Gives theory of simple integrating circuits of the LR or RC type; theory, construction and performance of a direct-coupled integrating amplifier for magnetic flux oscillography consisting of an integrating stage with capacitive feedback, followed by an amplifying stage.

Books

8287 Electrical Measurements. Firest K. Harris. 784 pages. 1952. John Wiley & Sons, New York. (TK375 H24e)

Outgrowth of a course of lectures on electrical measurements given over a 10-year period to students of electrical engineering and physics at the George Washington University. Includes art of measurement; electrical units; direct-current galvanometers; indicating instruments, direct-current ammeters and voltmeters; potentiometers; resistors and resistance measurements; ballistic galvanometers, magnets and magnetic testing; alternating-current ammeters and voltmeters; measurement of power; energy measurements; instrument transformers; wave-form and frequency measurements; and alternating-current bridges.

8288 The Oxide-Coated Cathode. Vol. I. Manufacture. Vol. II. Physics, Including Thermal Emission From Metals and Semi-Conductors. G. Hermann and Phil. S. Wagener. 148 and 311 pages. 1951. Chapman & Hall, Ltd., London. (Translated from German book published in 1944.) (QC701 H43otr)

Begins with historical review of the oxide cathode and a discussion of the different types and their applications. Followed by a description of manufacturing processes and of cathode characteristics. Concluded with a description of some special types of cathodes. Vol. II includes a discussion of fundamentals, presented under the main headings "Thermal Emission" and "Phenomena in Ionic Solids." A special chapter critically discusses methods for measuring the work function of electron emitters. The semiconductor model is used in dealing with the physics of the oxide cathode. References follow each chapter.

8289 Le Radar. (Radar). Robert LePretre. 294 pages. 1951. Gauthier-Villars, Imprimeur-Editeur, Paris. (TK6575 L55r)

Presents to the educated layman, not necessarily a specialist, an easy, yet complete and precise, description of the principles of radar and various radar apparatus. Discusses general principles of various radars, new developments, and the various transmitting and receiving parts now in use. In the last part, information on the use of numerous radars during the last war is given, and possibilities for application in peacetime are discussed.

8290 Fizicheskie Osnovy Elektrotekhniki. (Physical Bases of Electrical Engineering.) K. M. Polivanova. 556 pages. 1950. State Energy Publishing House, Moscow and Leningrad, U.S.S.R. (QC523 P75f)

Covers a wide range of electrical-engineering problems: the theory of field, processes in electro-ionic devices, circuit theories, elements of the theory of machines, theory of vibration, elements of radio engineering, and electrical measurements. Numerous practical examples. Recommended for students of advanced electrical-engineering courses and graduate students.

8291 Two Monographs on Electrokinetics. I. Studies of Electric Boundary Layers. Hermann L. F. von Helmholtz. **II. Electric Endosmosis and Streaming Currents.** Maryan von Smoluchowski. Translated by Phil E. Bocquet. 162 pages. Oct. 1951. Engineering Research Institute, University of Michigan. (Bulletin 33). (T1 M58e)

The first of these fundamental papers was published in *Annalen der Physik*, v. 3, no. 7, 1879; and the 2nd in "Handbuch der Elektrizität und des Magnetismus", Vol. II (Barth, Leipzig, 1921.)

See also:
6952 (electronic controls for machine tools)
7986 (nitrile-rubber gaskets for electrical assemblies)
8014 (electronics in the pigment industry)
8079 (aircraft electronics)

34. GRAPHIC ARTS

8292* Dependence of the Resolving Power of Photographic Materials on the Wave Length of the Light Acting Upon Them. (In Russian.) I. I. Breido and P. Kh. Pruss. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 21, 1952, p. 893-896.

The resolving power of 5 emulsions for various wave lengths was determined experimentally. Data are tabulated and charted. 12 ref.

8293* Reproduction of Micro- and Macro-Details by Photographic Layers. (In Russian.) G. A. Istomin. *Doklady Akademii Nauk SSSR*, new ser., 82, Feb. 21, 1952, p. 897-900.

The ability of various photosensitive materials to reproduce

details was investigated with reference to exposure time and other variables. Results are discussed and charted.

8294* Prevention of Metal Plate Oxidation in Lithographic Platemaking. Charles W. Latham. *American Printer*, v. 133, May 1952, p. 24-25, 50, 52, 54, 56.

Describes Cronak or Brunak treatment for metal lithographic plates. Prevents oxidation, simplifies platemaking, improves printing, produces sharper images, and improves grain characteristics.

8295* Platemaking in Lithography. Charles W. Latham. *American Printer*, v. 133, Apr. 1952, p. 36-37, 56, 58, 60.

Reviews the steps in lithographic platemaking by the 3 general processes in use—albumen, deep-etch, and polymetallic. The importance of uniformity in platemaking is stressed.

8296* The Latent Photographic Image. Its Formation in Light of Recent Investigations. (In German.) Hans Wolff. *Fortschritte der Chemischen Forschung*, v. 2, no. 3, 1952, p. 375-443.

111 references.

8297* Zinc Versus Aluminum Lithographic Plates. Charles F. King. *Inland Printer*, v. 129, Apr. 1952, p. 58-60, 98-99, 101.

8298* The Deep-Etch Plate. *Modern Lithographer and Offset Printer*, v. 48, Mar. 1952, p. 46-47.

Warns that the greater latitude offered by the above plate in the machine-room can lead to a decline in printing standards.

8299* Multi-Metal Plates Get "Beauty Bath" to Improve Reproduction. H. H. Slawson. Modern Lithography, v. 20, Apr. 1952, p. 34-35, 115.

Describes special equipment in the I. S. Berlin plant, Chicago, which treats plates in Oakite detergent.

8300* Lighting for Better Color Quality Control in the Graphic Arts. W. B. Reese. *Modern Lithography*, v. 20, Apr. 1952, p. 45-48.

Discusses above with special reference to establishing artificial ideal daylight conditions, including those for viewing transparencies. Graphs.

8301* The Preparing of Deep Etch Plates. Frank E. England. *National Lithographer*, v. 59, Apr. 1952, p. 32-33.

The 5th in a series of articles on the above. Deals with the correct press settings to get the superior results offered by bi- and multi-metal plates.

8302* Iron Plating Electrotypes and Stereotypes. Axel Lundbye. *Printing Equipment Engineer*, v. 82, Apr. 1952, p. 27-29.

Discusses all phases of the above.

8303 Tube Changes Electronic Impulses Into Visual Information. *Product Engineering*, v. 23, Apr. 1952, p. 203.

An electronic tube developed by Consolidated Vultee Aircraft Corp. changes electronic impulses into visual information that can be viewed on a screen or reproduced for permanent record on ordinary paper. Charactron high-speed printer is combined with xerographic printing equipment to provide a small, versatile unit capable of reproducing electronic pulses into readable information on paper at speeds of 20 in. of paper per sec. without film or liquid chemical processes. The proposed unit is small enough to conveniently fit most offices.

8304* Modern Foreign and Domestic Printing Presses. (In German.) G. Schneidereit. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Mar. 1, 1952, p. 191-199.

Various types are described, diagrammed, illustrated, and discussed.

Miscellaneous Publications

8305 Electric Drives in Papermills With Particular Reference to Closed-Loop Control. W. Spence. *Proceedings of the Technical Section, British Paper and Board Makers' Association*, v. 32, Dec. 1951, p. 681-698; disc., p. 699-706. (TS1080 P19p)

Discusses advantages to be gained by use of closed-loop control on drives for papermills. Principles are briefly covered and examples are described to indicate their practical application. One form of d.c. rotary amplifier, the amplidyne, is described in some detail. Applications to helper drives with torque or speed control; control of paper tension on supercalenders, rewinders, and paper-machine reels; and control of speed on rewinders are described.

8306 Modern Press Assemblies Incorporating Suction Pick-Up. T. Sutherst. *Proceedings of the Technical Section, British Paper and Board Makers' Association*, v. 32, Dec. 1951, p. 709-738; disc., p. 739-749. (TS1080 P19p)

A number of new designs and arrangements. Diagrams and illustrations.

8307 Some Properties of Certain Dyestuffs and Their Relation to Two-Sidedness of Paper. A. J. M. Draper. *Proceedings of the Technical Section, British Paper and Board Makers' Association*, v. 32, Dec. 1951, p. 751-767; disc., p. 768-770. (TS1080 P19p)

Experiments show that certain acid dyestuffs tend to migrate towards the hot surface when a sheet of paper dyed with them is dried by means of a heated metal surface. This gives rise to a two-sided effect which is not shown by similar sheets which have been air-dried. Some properties of the dyestuffs in relation to papermaking materials were studied and their reaction with size-alum precipitate investigated. 15 ref.

See also:
7678 (pigment deficiency in printing ink)
7679 (ink-grade carbon blacks)
8245 (high-speed printing equipment)

35. STATISTICS AND ECONOMICS

8308* The New Metals. *Analysts Journal*, v. 8, Jan. 1952, p. 95-104.

Verbatim report of speeches presented at the Eastern Regional Conference, New York Society of Security Analysts. General topics are "Titanium", "Future Markets for Aluminum"; "Other New Metals".

8309* Problem of Producing and Selling Tin. (In Portuguese.) Ciro T. De Padua. *Engenharia, Mineraçao e Metalurgia*, v. 16, Mar. 1952, p. 413-416.

A general discussion of the above is presented, including attempts at cartelization of the industry, new method of producing tinned sheet, future prospects of the tin market, and influence of Bolivian foreign policy on tin production.

8310* Current Trends in Foreign Trade Policies: Review of 1951. Part II. Trade Experience of Principal Free-World Countries. Henry Chalmers. *Foreign Commerce Weekly*, v. 47, Apr. 14, 1952, p. 3-7.

8311 Steel and the National Economy; A Survey of Current and Future Supplies and Demand. R. M. Shone. *Iron and Steel*, v. 25, Apr. 1952, p. 121-122.

8313 Unprecedented Expansion in the Mining Industry. James K. Richardson. *Mining Engineering*, v. 4, Apr. 1952, p. 351-355.

Gives a brief summary of major developments contemplated or under way in the U. S. minerals field.

8314 Chromium; Ranks Among the Most Strategic of Metals. Roland D. Parks. *Mining Engineering*, v. 4, May 1952, p. 469-475.

General discussion of above. Refers to metallurgical uses, grades of ore and deposits, world reserves, and demand. Table gives world production of chromite.

8315 Saskatchewan's Industrial Minerals. A. J. Williams. *Mining Engineering*, v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 396-400.

Surveys above, presenting information on geology, clays, bentonites, Na_2SO_4, Mg compounds, volcanic ash, silica sand, marl, quartzite pebbles, salt, potash, feldspar, asbestos, and limestone. Maps, tables, and 12 ref.

35. *Statistics and Economics*

8316 Foreign Production and Development During 1951. *Journal of Petroleum Technology*, v. 4, Sec. 1, Apr. 1952, p. 11-16.

Presents brief accounts of above for Mexico, Canada, and various countries of Europe, Far and Middle East, and South America.

8317* Nine Steel Firms Active in Six New Iron Ore Ventures. David N. Skillings. *Skillings' Mining Review*, v. 41, Apr. 26, 1952, p. 1-2, 19.

Six large ventures in iron ore, domestic and foreign, appear to be moving the geographical center of iron ore mining eastward in the Western Hemisphere—the Labrador ore fields and the Venezuela ore fields are the new potent lines of force.

8318 Minor Metals are Major Issue. J. L. Bray. *Steel*, v. 130, Apr. 21, 1952, p. 80-82.

General discussion of the above with respect to new sources sought, applications, and future supplies for Ni, Cr, Co, W, Cb, Ta, and Ti.

8319* Italian Iron and Steel Production; New Cornigliano Plant as Part of Modernization Scheme. *Times Review of Industry*, v. 6, Apr. 1952, p. 84.

8320* Annual Review of the Mining and Oil Industries in Western Canada. *Western Miner*, v. 25, Apr. 1952.

The entire issue is devoted to articles on various parts of Canada and Alaska with respect to different aspects of the above.

Miscellaneous Publications

8321 An Appraisal of Minable Coking-Coal Reserves in the United States. Albert L. Tonges. Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1951, p. 45-48; disc., p. 48-53. (TN713 Am35p)

Includes tabular comparison of estimates.

8322 The Tungsten Situation in Montana as a Factor in National Defense. Donald W. McGlashan. Bureau of Mines and Geology, State of Montana, Miscellaneous Contribution 12, 1952, 47 pages. (TN21 M76me)

Surveys resources and presents detailed economic analysis of prospects for increased utilization of Montana tungsten ores. Extensive tables and graphs.

8323 Geographical Factors in the Utilization of the Mineral Resources of Brazil. S. Froes Abreu. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II, Mineral Resources", 1951, p. 17-21; disc., p. 35-39. (HC13 Un3p)

Shows that the greater part of the mineral production in Brazil comes from a 500-km. strip along the eastern coast. Mention is made of the principal minerals and ores produced with reserves presented, grades shown, and geographical conditions favorable or unfavorable to their economic utilization emphasized. 14 ref.

8324 The Supply and Industrial Applications of Scrap Metals. H. J. Miller. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 24-32., disc., p. 35-39. (HC13 Un3p)

Estimates are given of the world's total store of metals, these having been derived by use of certain assumed recovery factors for individual metals. From statistical data available in both the U. S. and the United Kingdom for Cu, Pb, Zn, Al, and other metals, estimates are made of the probable supply position for scrap, relative to virgin metals. Uses of both old and new scrap are considered and difficulties involved in utilizing scrap so that the products comply with modern specifications are mentioned.

8325 Foreign Trade of the United States, 1936-49. Office of International Trade, Bureau of Foreign and Domestic Commerce, U. S. Dept. of Commerce, International Trade Series no. 7, 1951, 58 pages.

Books

8326 American Pipe Lines; Their Industrial Structure, Economic Status, and Legal Implications. George S. Wolbert, Jr., 179 pages. 1952. University of Oklahoma Press, Norman, Okla. (TN879.5 W83a)

Extensive footnote references.

8327 Proceedings of the Nnited Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources. 303 pages. 1951. Department of Economic Affairs, United Nations, New York. (HC13 Un3p)

Series of papers and accompanying discussion, appearing under the following broad headings: Mineral Supplies and Their Measurement; The Outlook for Future Discovery; Increasing Mineral Resources by Discovery; Conservation in Mining and Milling; Conservation in Manufacture; Conservation by Corrosion Control; Conservation by Substitution; and Inorganic Fertilizers in Conservation. Selected papers are separately abstracted.

8328 Economic Survey of Europe in 1950. 263 pages. 1951. Research and Planning Div., Economic Commission for Europe, United Nations, Geneva, Switzerland. (HC240 Un3.5e)

A comprehensive treatise on the above, including numerous tables and a few graphs.

8329 The Economic Report of the President Transmitted to the Congress Jan. 16, 1952. 220 pages. 1952. U. S. Government Printing Office, Washington. (HC106.5 Un3e)

Includes Annual Economic Review by the Council of Economic Advisers. Tables and graphs.

See also:
6862 (time study system for foundry)
7682 (chemical engineering cost estimation)
8067 (sources and economics of potash for fertilizer)

36. MISCELLANEOUS

8330* Copper and Copper Alloys. Clement Blazey. *Australasian Engineer*, Feb. 7, 1952, p. 69-75. (From Symposium on "Modern Trends in Non-Ferrous Metals and Alloys".

Summarizes the present position of Cu and Cu alloys, from both research and practical espects, in general terms rather than in detail. Changes and trends in production and uses of Cu are briefly described, and reasons given for believing that plain Cu and Cu-Cd will retain their position as the principal electrical conductors. Composition, heat-treatment, and properties of typical age or temper-hardening alloys are given. Reference is made to the manner in which established alloys are being modified in composition for both general and special uses, and attention is drawn to the study of creep and fatigue. 12 ref.

8331* The Aluminium Industry: History, Production Processes, Future Prospects. L. W. Malmgren. *Australasian Engineer*, Feb. 7, 1952, p. 82-91.

8332* The State of Russian Science Today. Part III. Impressions From a Recent Moscow Visit. Kathleen Lonsdale. *Bulletin of the Atomic Scientists*, v. 8, Mar. 1952, p. 66-70, 78.

8333 Gallium. G. H. Wagner and W. H. Gitzen. *Journal of Chemical Education*, v. 29, Apr. 1952, p. 162-167.

General discussion covering history, properties, occurrence, recovery, analysis, production and prices, and uses. 39 ref.

8334 Cast Alloy Reference Sheet. N. S. Mott. *Chemical Engineering Progress* (Engineering Section), v. 48, Apr. 1952, p. 208.

Presents data on highly corrosion resistant 20-29-2-3 Cr-Ni-Mo-Cu alloy for machinability, heat treatment, weldability, corrosion resistance, and mechanical and physical properties. Especially useful for handling hot corrosive chemicals.

8335* Preliminary Studies on the Biogeochemistry of Iron and Manganese. Harry V. Warren, Robert E. Delavault, and Ruth I. Irish. *Economic Geology*, v. 47, Mar.-Apr. 1952, p. 131-145.

Deals with above in relation to use in prospecting. Tabular data.

8336 Heat Relief in Industry. Bartlett R. Small. *Iron and Steel Engineer*, v. 29, Apr. 1952, p. 71-77; disc., p. 77-83.

Discusses various methods suitable for the above. Covers ventilators, radiant-heat shielding, and local cooling. Radiation is probably the major cause of discomfort. Photographs, and table of emissivities of several metals.

8337* Extraction of Zinc-Containing Protein From Human Leucocytes. Frederic L. Hoch and Bert L. Vallee. *Journal of Biological Chemistry*, v. 195, Apr. 1952, p. 531-540.

Concerns the physiological significance of Zn in human leucocytes through a study of its chemical association with other components of cells. Tabular data. 18 ref.

8338* The Skeletal Deposition of Yttrium. Norman S. MacDonald, Ralph E. Nusbaum, George V. Alexander, Florita Ezmirlian, Patricia Spain, and Donald E. Rounds. *Journal of Biological Chemistry*, v. 195, Apr. 1952, p. 837-841.

ing rats showed that Y is not a "bone seeker" of the same degree ing rats found that Y is not a "bone seeker" of the same degree as Sr and Pb.

8339 Manganese For the Steel Industry. F. W. Boulger and R. C. Buehl. *Journal of Metals*, v. 4, May 1952, p. 468.

In reference to future sources of supply, describes methods for recovery of Mn from slag.

8340 Carbon and Graphite Materials and Parts. Philip O'Keefe. *Materials & Methods*, v. 35, Apr. 1952, p. 119-133.

Covers the following points: engineering properties, fabrication and design, mechanical parts, electrical, refractory, and chemical applications.

8340a A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging*, v. 19, Feb. 1952, p. 51-60; Mar. 1952, p. 115-122.

Begins listing of definitions of metallurgical terms. Feb. issue covers "A"—"Argon"; Mar. issue, "Argon"—"Bingham's Etch"; Apr. issue, "Biotite"—"Browning"; (To be continued.)

8341* Titanium Carbide: A Very Refractory and Light Substance. (In French.) M. Oswald. *Métaux: Corrosion—Industries*, v. 27, Feb. 1952, p. 75-87.

Discusses heat resistance; solvent properties for other elements (including the systems Ti-C-N, Ti-C-O, Ti-C-N-O, Ti-C-N-Zr, Ti-C-N-Cb, Ti-C-N-V, and systems with nonisomorphous carbides); density of TiC and some of its solid solutions; production and applications; and general conclusions. Tables and graphs. 21 ref.

8342 Stainless Clad Copper For High Temperature Service. Joseph Kinney, Jr. *Product Engineering*, v. 23, Apr. 1952, p. 129-133.

The above offers a combination of the high thermal conductivity of Cu with the corrosion and heat resistance of stainless steel. Data on mechanical and physical properties, workability, corrosion resistance, annealing, and welding are charted and discussed.

8343* The Organization of a Research Centre Devoted to Glass Technology. Ivan Peychès. *Journal of the Society of Glass Technology* (Transactions Section), v. 35, Dec. 1951, p. 506-523.

Discusses requirements in design and operation of an industrial research organization. Shows application in the design of the new Centre des Recherches des Glaceries de la Compagnie de Saint-Gobain, Paris. Flow diagram and photographs.

Miscellaneous Publications

8344 Uranium-Copper Deposits Near Copper Canyon, Navajo Indian Reservation, Arizona. E. V. Reinhardt. Division of Raw Materials, U. S. Atomic Energy Commission, RMO-902, Mar. 1952, 11 pages. (UF767 U3r)

Includes maps.

Books

8345 Make Your Business Letters Make Friends. James F. Bender. 250 pages. 1952. McGraw-Hill Book Co., New York. (HF5721 B43m)

Shows you how to improve the force and clarity of your commercial correspondence, how to measure your letter-writing ability; develop an individual style; avoid wasteful words, poor organization, and trite expressions. Includes a chapter on the art of dictation. Other useful and practical features include: a list of 1,000 words most often used, a brief catalog of common business terms, with definitions and examples, a list of 85 "dont's" for secretaries, a summary of right and wrong usage, a review of correct forms of salutations and address for titled personages.

8346 The Saga of the Abrasives Industry. Muriel F. Collie. 386 pages. 1951. Grinding Wheel Institute and Abrasive Grain Assn., Greendale, Mass. (TN936 C69s)

An illustrated history.

8347 Man and the Chemical Elements From Stone-Age Hearth to the Cyclotron. J. Newton Friend. 354 pages. 1951. Charles Griffin & Co. Ltd., London. (QD11 F91m)

Presents history of discovery and development of commercial use of the various elements, with major emphasis on their inorganic chemistry. Most of the chapters cover groups of elements, rather than specific ones.

8348 Priroda Goroda Moskvy i Podmoskovia. (Nature of the City of Moscow and Its Environs). A. A. Grigorev and G. D. Rikhter, editors, 378 pages. 1947. Geographic Institute, Academy of Sciences of the U.S.S.R., Moscow and Leningrad. (HC335 G87p)

Discusses in detail the geography, geology, climate, and flora and fauna of the Moscow area and the city itself. Maps, tables, and photographs.

8349 Elements of Physical Metallurgy. Albert G. Guy. 293 pages. 1951. Addison-Wesley Press, Inc., Cambridge, Mass. (TN690 G98e)

A textbook for courses in fundamentals of physical metallurgy. Covers atomic and crystal structure; equilibrium diagrams; structure of alloys; physical properties; elasticity and plasticity of metals; corrosion; diffusion; recovery, recrystallization, and grain growth; heat treatment of steel; and a survey of metallurgy.

8350 The Aurorae. Vol. I. L. Harang. 163 pages. 1951. John Wiley & Sons, New York. (QC971 H21a)

A comprehensive survey of the facts concerning the appearance of auroral phenomena. Attention has been given to methods of height determination and other matters on which the original publications are not readily available.

8351 Bioluminescence. E. Newton Harvey. 649 pages. 1952. Academic Press Inc., New York. (QH641 H26b)

The various luminous groups are treated in phylogenetic order as biological entities, with a short discussion of the luminous species and their habits, followed by a statement of the known facts concerning morphology, histology, physiology, biochemistry, and biophysics of light-producing cells or organs.

8352 Aerodynamic Drag. Sighard F. Hoerner. 259 pages. 1951. Otterbein Press, Dayton, O. (TL574.D7 H67a)

Not a theoretical textbook. The results of theoretical calculations are used, however, as a basis and a framework, within which the various problems concerning the drag of bodies in air or in any other medium are presented. Theoretical predictions are checked by corresponding experimental data. Practical conclusions are drawn from more academic functions.

8353 Out of the Sky. H. H. Nininger. 336 pages. 1952. University of Denver Press, Denver, Colo. (QB755 N620)

Where do meteorites come from? What are they made of? What factors are responsible for their peculiar structures? How fast do they travel? What happens when they collide with the earth? With the moon? Answers and theories are given in nontechnical terms as a foundation for the study of meteoritics. Theoretical, as well as factual, developments are considered. Over 170 photographs.

8354 Recent Progress in Hormone Research. Vol. VI. Gregory Pincus, editor. 431 pages. 1951. Academic Press, Inc., New York. (QP 801.H7 R24)

Presents the proceedings of the Laurentian Hormone Conference. Section topics are: "Gonad Development and Function", "The Use of Isotopes in Hormone Problems", "Hormones and

36. *Miscellaneous*

Metabolism", "Chemistry, Physiology, and Clinical Endocrinology of the Adrenal Cortex", and "Hormone Therapy in Cancer".

8355 Météorologie et Physique du Globe. Tome I. Météorologie Nautique. (Physics of the Globe. Vol. 1. Nautical Meteorology.) Ed. 2. J. Rouch. 177 pages. 1950 société d'Éditions Géographiques, Maritimes et Coloniales, Paris. (QC861 R75m)

Intended as a guide for naval personnel. Discusses the atmosphere, meteorological instruments on ships, maritime climatology, maritime routes, weather forecasting and maps, cyclones, typhoons, squalls, whirlwinds, fogs, and other meteorological phenomena.

8356 Météorologie et Physique du Globe. Tome II. Physique des Mers. (Meteorology and Physics of the Globe. Vol. 2. Physics of the Seas.) J. Rouch. 222 pages. 1941. Société d'Éditions Géographiques, Maritimes et Coloniales, Paris. (QC861 R75m)

Discusses the principal natural physical phenomena in the field of oceanography. Includes measurement of the depth of the sea; principal deep spots of the seas; surface waters; various movements of the sea, the Gulf Stream, the Sargasso Sea, etc.; glaciers; alkalinity and color of sea water, water of deep seas; terrestrial magnetism; atmospheric electricity; specific gravity of the sea; and underwater earthquakes.

8357 Effects of Taxation on Executives. Thomas H. Sanders. 229 pages. 1951. Div. of Research, Graduate School of Business Administration, Harvard University, Boston. (HJ5665 Sa56e)

Deals with taxes and their effects on the executives' efforts, the intensity and duration of their active business careers, their retirement, and struggles to achieve personal financial competence. The materials presented and the conclusions reached are based primarily upon personal interviews. This book makes its major contribution through its descriptions of executives as complex human beings subject to a variety of conflicting motivations.

8358 Introduction to the Study of Aircraft Vibration and Flutter. Robert H. Scanlan and Robert Rosenbaum. 428 pages. 1951. MacMillan Co., New York. (TL574.V5 Sca61i)

Presents a resume of representative engineering practices in the American aeroelastic field. The first 6 chapters contain basic material which serves as a foundation for later chapters. More advanced material, for which a foundation is not completely laid in the main text, is reserved for the Appendix. Emphasis is on "classical" questions, e.g., the mechanics of linear structural vibration and the various cases of wing flutter, the air forces for which can be described by potential theory in incompressible air.

8359 Panorama of Science, 1951. Annual Supplement to the Smithsonian Series for 1951. Webster Prentiss True, editor. 416 pages. 1951. Series Publishers, Inc., New York (Q5 Sm69)

Contains 27 articles selected from the scientific and technical periodicals published during late 1949 and 1950. Those selected for inclusion are the more generalized discussions which can readily be followed by the general reader. They cover an extremely wide range of topics including astronomy, space flight, atomic energy, ultrasonics, metallurgy, mineral reserves, sociology, geriatrics, aerial photography, etc.

8360 Odors and the Sense of Smell; A Bibliography: 320 BC-1947. 342 pages. 1952. Airkem, Inc., New York. (Z7994.A5 Od5)

A comprehensive classified bibliography. Main topics include anatomy of the olfactory system; physiology of the olfactory sense; pathology and perversion of odor perception; body odors; aromatic chemicals, essential oils; the chemistry of odors; classification of odors; odor detection, tests, and measurements; odors of food and water; industrial and miscellaneous odors; perfumes and floral odors; odor control; and theories of odor stimulation.

8361 Ohio Department of Natural Resources, Second Annual Report July 1, 1950—June 30, 1951. 259 pages. Department of Natural Reosurces, State of Ohio, Columbus. (HC10 D44a)

Includes tables, graphs, and illustrations.

8362 New Horizons. 182 pages. 1951. Pan American World Airways, Inc. (G150 P19n)

Tells how to get the most out of your trip abroad. Not a "travel book" in the ordinary sense. Does not deal with "impressions"; but with facts, carefully gathered by Pan American World Airways from its stations in all parts of the world. Presents very detailed information. Includes 13,501 facts about what to see, do, wear, and take home from over 900 places on 6 continents.

8363 The Rockefeller Foundation Directory of Fellowship Awards for the Years 1917-1950. 286 pages. 1951. Rockefeller Foundation, New York, N. Y. (LB2338 R59d)

Contains information on 6,342 fellowships. The main body of this directory contains alphabetical entries for 5.026 individuals. The names are then regrouped in a roster, according to latest country of residence and field of interest.

8364* Directory of Building Research and Development Organizations in Europe. 123 pages and index. 1951. United Nations, Geneva. (Directory shelf)

Designed to serve as a manual for research workers, the building industry and professions, and government agencies. Following the introductory article which sketches briefly the evolution of building research in Europe, a section is devoted to each country listed. Where information is available, each section is introduced by a brief outline of the pattern of building research in that country. Two indices are provided: one by fields of work, and the other by names of organizations, persons and countries.

See also:

6783 (rare-earth properties and applications)
6819 (metallurgy and properties of alloy steel)
6912 ("High Strength Cast Iron"—Piwowarsky)
7462 (metals for springs)
7470 (miscellaneous information on light metals)
7544 (peacetime effects of atomic energy)
7736 (British chemical equipment directory)
7915 ("Antibiotics"—German book)